

INTERCOLONIAL
MEDICAL CONGRESS

OF

AUSTRALASIA.

THIRD SESSION.

SYDNEY, 1892.



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INTERCOLONIAL MEDICAL CONGRESS OF AUSTRALASIA.

TRANSACTIONS

OF THE

THIRD SESSION,

HELD IN

SYDNEY, NEW SOUTH WALES,

SEPTEMBER, 1892.

EDITED UNDER THE DIRECTION OF THE LITERARY COMMITTEE,

BY

L. RALSTON HUXTABLE, M.B.



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PREFACE.

THE Literary Committee, in presenting to the Members of the Intercolonial Medical Congress of Australasia the Transactions of their Third Session, desire to explain that several circumstances have combined to prevent an earlier issue of the volume; among these has been the need of referring many of the papers to the authors of them for abridgment. For the ready manner in which the several writers have co-operated with the Editor in his endeavour to keep the volume within its present moderate dimensions the Committee wish to express their thanks.

The thanks of the Members of the Congress are no less due to Mr. Potter, the Government Printer, and his staff, to whose courtesy and skill they are greatly indebted, for the handsome manner in which the work is now presented.

The generous action of the Premier, the Hon. Sir George R. Dibbs, in offering to have the Transactions printed at the Government expense, has placed the profession under a debt of obligation to him and to the Members of his Government. In accepting this offer it was understood that the work of printing the Transactions at the Government Printing Office should be proceeded with subject to the more urgent demands made upon that office by the Public Service, and these demands have proved greatly in excess of what was anticipated, and such as to entail a very considerable delay in proceeding with the work.

It is hoped that the work will be accepted by the Members as a satisfactory record of the proceedings of the late Session—proceedings which were of interest and value in recording the progress of Medical Science, in indicating new paths of research, and, not the least, in fostering that *esprit de corps* which so largely contributed to the success of the Congress of 1892.

By order of the Literary Committee,

P. SYDNEY JONES,

Sydney, June, 1893.

President.

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THIRD SESSION, 1892.

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Rules of the Congress.

Rule I.—The Third Session of the Intercolonial Medical Congress of Australasia will be opened in Sydney on Monday, 26th September, 1892.

The meetings for business will commence that day at 11 a.m., and will terminate on the following Friday.

All applications for membership shall be dealt with by the Executive Committee, and members will be registered and the tickets issued upon their acceptance by the Executive Committee and upon their paying their subscription to the Honorary Treasurer.

Rule II.—The Congress shall be composed of medical practitioners legally qualified to practise in their respective countries, who shall have inscribed their names on the register of the Congress, and shall have taken out their tickets of admission. The subscription is fixed at one guinea, which amount is to be paid on or before inscription, and before the commencement of attendance at the meetings. Each member of the Congress will be entitled to a copy of the Transactions when published.

Rule III.—The work of the Congress shall be divided into five sections, as follows :—

- (1.) Section of Medicine, which will be held to include Diseases of the Skin.
- (2.) Section of Surgery, which will be held to include Diseases of the Eye, Ear, and Throat.
- (3.) Section of Midwifery and Diseases of Women and Children.
- (4.) Section of Public Health, which will be held to include State Medicine, Forensic Medicine, Psychological Medicine, and Demography.
- (5.) Section of Anatomy, Physiology, Pathology, and Pharmacology.

Museums of objects of scientific and professional interest will be on view during the meeting.

Rule IV.—The Executive Provisional Committee shall consist of the President of the Congress, an Honorary Treasurer, and two joint Honorary General Secretaries, and of members elected in Sydney by the medical societies of New South Wales. It shall have power to add to its number, and to nominate a General Committee and all other officers of the Congress, and to fill any vacancy occurring in the Executive Committee.

Rule V.—The first general meeting of the Congress will take place on Monday, 26th September, 1892, at 11 a.m., at the Sydney University, when the President will deliver an inaugural address.

Rule VI.—Notices of papers, together with the abstracts of the papers, to be read in any of the sections, must be sent to the Secretaries of that section before 31st August, 1892. These abstracts will be regarded as strictly confidential communications, and will not be published before the meeting of the Congress. The officers of each section shall decide on the advisability of accepting any communication addressed to their section, and also the time when it shall be made. No communication will be received which has been already published.

Rule VII.—All addresses and papers read either at general meetings or in the sections are to be immediately handed to the Secretaries. The Executive Committee, at the close of the Congress, will proceed with the publication of the Transactions, and reserves to itself full power to decide which papers shall be published, and whether in whole or in part.

Rule VIII.—No speaker will be allowed more than ten minutes, with the exception of readers of papers and those who introduce debates, who may occupy fifteen minutes, or, at the option of the section, ten minutes longer.

It is recommended that the duration of a debate on any subject be limited to one hour.

Rule IX.—To ensure accuracy and facilitate the publication of the proceedings, speakers shall, before the conclusion of each meeting, hand to the Secretaries of the section, in writing, the substance of their speeches.

It is suggested that all papers and abstracts shall be, if possible, type-written, for which the Executive Committee will afford special facilities.

Rule X.—The President of each section shall direct its discussions, according to the rules usually observed in deliberative assemblies.

He will decide upon the daily programme in conjunction with the officers of the section.

Rule XI.—The Executive Committee reserves the power to invite distinguished persons to any or all of the meetings of the Congress.

Medical students will be admitted free of subscription to the business meetings of the Congress upon the recommendation of the Executive Committee, but will not be permitted to take any part in the proceedings.

Rule XII.—Communications and questions relating to the business of any of the sections must be addressed to the Secretaries of that section.

All other communications should be sent to the Honorary General Secretaries.

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Those names preceded by an asterisk were members of the General Committee of the Congress, *vide* page 2.

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 Warren, W.; Professor of Engineering, University of Sydney, N.S.W.
 Wolfe, J. R., M.D., Glas., L.F.P.S., Glas., F.R.C.S.
 Waters, George A., M.D.; Surgeon, H.M.S. "Boomerang."

(NOTE.—The number of members enrolled as above is, members, 587; honorary members, 43; total, 630. Of the Congress of 1889 there were enrolled, members, 540; honorary members, 13; total, 553. Of the Congress of 1887 there were enrolled, members, 155; honorary members, 0.)

List of Papers contributed to the Congress.

SECTION I.—MEDICINE.

1. Notes on Lead Poisoning, as observed among Children in Brisbane. Visiting Staff and Resident Surgeon, Brisbane Hospital for Sick Children.
2. A case of Progressive Muscular Atrophy with unusual Cord Lesions. John Gibson, M.D., Edin.; Windsor.
3. Spinal Irritation. A. Jarvie Hood, M.B., Glas.; Sydney.
4. Diabetes, with a case of recovery from Diabetic Coma by the use of Oxygen Gas. L. W. Bickle, L.C.R.P., Lond.; L.R.C.S., Edin.; South Australia.
5. A form of Cerebral Disease characterised by definite symptoms, probably a localised basic meningitis. A. Jefferis Turner, M.D., Lond.; Brisbane.
6. Is Beri-Beri endemic in Melbourne? C. H. Molloy, M.D., Melb.; Melbourne Hospital.
7. Hypnotic Suggestion and its Therapeutic Value. Richard Arthur, M.A., M.D., Edin.; Sydney.
8. Notes on two cases of Empyema in Children, mistaken at their onset for cases of Peritonitis. H. H. Fleming, M.D., Dub.; St. Arnaud, Victoria.
9. Some points in the Etiology, prevention, and treatment of Pulmonary Consumption. James P. Ryan, M.K.Q.C.P., Irel.; L.R.C.S., Irel.; Melbourne.
10. Treatment of Asthma. Duncan Turner, L.R.C.S., Edin.; L.R.C.P., Lond.; Melbourne.
11. A case of Aneurism, with rupture into Pericardium. Patrick Blackall, M.D., Ch.M., Royal Univ., Irel.; Queanbeyan.
12. Some points in connection with Small Pox. James Struthers, M.D., Aber.; Rylstone.
13. Chlorosis. T. T. Fleetwood, M.A., Melb.; M.B., Dub.; F.R.C.S., Ireland; Warrnambool.
14. Notes on the occurrence of *Anchylostomum duodenale* in Queensland. J. Lockhart Gibson, M.D., Edin.; and J. Jefferis Turner, M.D., Lond.; Brisbane.
15. Snake-bite in Australia. Recent Statistics and a review of recent observations. L. R. Huxtable, M.B., Edin.; Sydney.
16. Snake Poison, its Physical and Chemical qualities, and Physiological action. A. Mueller, M.D., Giessen; Yackandandah.
17. Eighteen months experience with Tuberculin. J. W. Springthorpe, M.D., Melb.; M.R.C.P., Lond.; Melbourne.
18. Pearl Diving from a Physician's point of view. A. E. Salter, M.B., Ch.B., Melb.; Thursday Island.
19. Notes on a case of Syphilis of the Heart. T. Fiaschi, M.D., Pisa; Sydney.
20. The Treatment of Hepatic Colic by large doses of Olive Oil. P. Sydney Jones, M.D., Lond.; F.R.C.S., Eng.; Sydney.
21. A case of Chylous Ascites. A. A. Lendon, M.D., Lond.; M.R.C.S., Eng.; Adelaide.
22. On the supposed relation between human Diphtheria and an outbreak of disease which was very fatal amongst swine in Geelong last year. W. Paynter Sloggett, L.R.C.P., Irel.; M.R.C.S., Eng.; Dip. State Med.—Melbourne.
23. Remarks on 750 cases of skin diseases; and
24. Dermatitis Herpetiformis. A. W. Finch Noyes, L.R.C.P. Lond.; M.R.C.S., Eng.; Melbourne.

25. Reclamation of Nailbed and treatment of Hirsuties, by Electrolysis ; and
26. Pathological specimen of a rare skin disease. Herman Laurence, M.R.C.P., Edin. ; Melbourne.
27. Movable Kidney. J. W. Dunbar Hooper, L.R.C.P., L.R.C.S., Edin. ; Melbourne.
28. Sequel to case of Cerebellar Tumour, with Exhibition of Specimen. H. Maudsley, M.D., M.R.C.P., Lond. ; Melbourne.
29. The Electro-Neurotome, a new method of applying Electricity, with remarks on some cases ; and
30. Notes on the rational treatment of Phthisis. G. L. O'Neill, M.B., C.M., Edin. ; Sydney.
31. Disinfection of the Alimentary Canal. J. M. Creed, M.R.C.S., Eng. ; L.R.C.P., Edin. ; Sydney.

SECTION II.—SURGERY.

GENERAL SURGERY AND MISCELLANEOUS.

1. Disinfection in Surgical Practice. W. Camac Wilkinson, M.D., Lond. ; M.R.C.P., Lond. ; Sydney.
2. Death under Anæsthetics. A. Shewen, M.D., Lond. ; M.R.C.S., Eng. ; Sydney.
3. Synopsis of deaths from Anæsthetics in N.S.W. for the past ten years. S. T. Knaggs, M.D., F.R.C.S., Irel. ; Sydney.
4. The mental effects of Chloroform as an element of danger in the production of Syncope. C. H. Molloy, M.D., Ch.B., Melb. ; Melbourne.
5. The Drainage Tube—its disadvantages. C. A. Wolfgang Hunt, M.B., Syd. ; Toowoomba.
6. On Military Surgery. W. D. C. Williams, L.R.C.P., Lond. ; M.R.C.S., Eng. ; Brigade Surgeon, Sydney, N.S.W.
7. A case of Rhinoplasty—Exhibit. Alex. MacCormick, M.D. (Ed.), M.R.C.S., Eng. ; Sydney.
8. Excision of wall of Pharynx—Exhibit. Alex. MacCormick, M.D. (Ed.), M.R.C.S., Eng. ; Sydney.

SURGERY OF BONES, JOINTS AND TENDONS.

9. Two cases of acute purulent Synovitis of knee and of ankle, treated by incision and washing out with Peroxide of Hydrogen ; and
10. Notes on cases of Chronic Abscess, treated by Barker's method, without drainage. George Cleghorn, M.D., Durham ; M.R.C.S., Eng. ; Blenheim, New Zealand.
11. Two cases of Ankylosis of the lower jaw. Ben. Poulton, M.D., Melb. ; M.R.C.S., England ; Adelaide.
12. Subcutaneous wiring of Fractured Patella. T. N. Fitzgerald, F.R.C.S., Irel. ; Melbourne.
13. Osteotomy for badly united fractures. Notes of cases with remarks on the operation. Aeneas J. McDonnell, M.B. et M.Ch., Syd. ; Toowoomba, Queensland.
14. Dislocation of the acromio-clavicular joint. Geo. E. Twynam, M.R.C.S., Eng. ; L.R.C.P., Lond. ; Sydney.
15. A method of treating fracture of the Patella. Geo. E. Twynam, M.R.C.S., Eng. ; L.R.C.P., Lond. ; Sydney.
16. On the treatment of webbed fingers with new splint. W. J. Rocckel, M.B., et Ch.B., L.R.C.P., Lond. ; F.R.C.S., Eng. ; Melbourne.
17. The nature and treatment of Ganglion. G. A. Syme, M.B., M.Ch., Melb. ; F.R.C.S., Eng. ; Melbourne.
18. On the treatment of Lateral Curvature of the spine. J. A. G. Hamilton, M.B., Dub. ; L.R.C.S., Edin. ; Adelaide.

TRACHEOTOMY AND INTUBATION OF LARYNX.

19. On 120 cases of Tracheotomy for Diphtheria. Charles B. Clubbe, L.R.C.P., Lond.; M.R.C.S., Eng.; Sydney.
20. On Intubation of the Larynx. A. Jefferis Turner, M.D., Lond.; M.R.C.S., Eng.; Brisbane.
21. Tracheotomy. W. H. Crago, L.R.C.P., Lond.; M.R.C.S., Eng.; Sydney.

ABDOMINAL SURGERY.

22. Acute appendicitis, perforation, drainage recovery. John Gibson, M.D., C.M., Edin.; Windsor, N.S.W.
23. Cases of Intestinal Obstruction—exhibit. Alex. MacCormick, M.D., Edin.; M.R.C.S., Eng.; Sydney.
24. Cases of Pylorotomy. Alex. MacCormick, M.D., Edin.; M.R.C.S., Eng.; Sydney.
25. Remarks on the radical cure of Hernia. F. D. Bird, M.B., Melb.; M.R.C.S., Eng.

SURGERY OF THE URINARY ORGANS.

26. Impaction of Calculus in the Ureter—Removal. J. C. Verco, M.D., Lond.; F.R.C.S., Eng.
27. Surgery of Kidney. Geo. E. Twynam, M.R.C.S., Eng.; L.R.C.P., Lond.; Sydney.
28. A case of Obstructed Micturition, Congenital Dilatation of the Ureter—(Nephrectomy). Geo. E. Twynam, M.R.C.S., Eng.; L.R.C.P., Lond.; Sydney.
29. The distribution of Calculus of the Bladder in Australia for the years 1888, 1889, 1890, and 1891, and the methods of treatment adopted. J. B. Nash, M.D., Edin.; M.R.C.S., Eng.; Wallsend, N.S.W.

SYPHILOGRAPHY.

30. Remarks on Syphilis. W. Chisholm, M.D., Lond.; M.R.C.S., Eng.; Sydney.

SURGERY OF THE NERVOUS SYSTEM.

31. Case of Neuroma of the Median Nerve, recurring three times after removal, with final amputation at shoulder joint. R. S. Bright, M.R.C.S., Eng.; Hobart, Tasmania.
32. A case of injury to the Brachial Plexus during parturition. C. E. Todd, M.D., Brnx.; L.R.C.P., Lond.; M.R.C.S., Eng.; Adelaide.
33. Neurectomy in Spasmodic Torticollis. W. Gardner, M.D., Glas.; Melbourne.
34. A series of papers on Head Injuries. C. S. Ryan, M.B., C.M., Edin.; M.B., Melb.; Melbourne.
35. Two cases of removal of a Brain Tumour. George Cleghorn, M.D., Durham; M.R.C.S., Eng.; Blenheim, N.Z.
36. On the treatment of Meningeal Hæmorrhage. Thomas Fiaschi, M.D., Ch.D., Pisa; Sydney.
37. On a successful case of Nerve-grafting. F. D. Bird, M.B., Melb.; M.R.C.S., Eng.

HYDATIDS.

38. An enquiry into the results immediate and remote of tapping Hydatid Cysts. P. Sydney Jones, M.D., Lond.; F.R.C.S., Eng.; Sydney; and R. Scot Skirving, M.B., C.M., Edin.; Sydney.
39. Hydatids of the Brain, especially with reference to their treatment by operation. J. C. Verco, M.D., Lond.; F.R.C.S., Eng.; Adelaide.
40. On the treatment of Hydatids by the injection of a solution of Hydrarg-Perchlor. Philip T. Thane, L.R.C.P., Lond.; M.R.C.S., Eng.; etc., Yass.
41. The cure of Hydatid Cysts by the injection of a strong solution of Perchloride of Mercury. J. Tremearne, M.R.C.S., Eng.; Creswick, Victoria.
42. On Fatal Cases of Hydatid Disease after Operation, with remarks. Ben Poulton, M.D., Melb., M.R.C.S., Eng.; Adelaide.
43. The surgical treatment of Hydatids based upon an examination of 80 cases operated on at the Adelaide Hospital during the last four years and a half. E. C. Stirling, M.A., M.D., Cantab.; F.R.C.S., Eng.

44. Multiple Hydatids and their origin. James Graham, M.D., C.M., Edin.; Sydney.
45. Hydatids in both Lungs and both lobes of the Liver. Four operations by incision. Recovery. This is a sequel to a case reported at the last Session. J. C. Verco, M.D., Lond.; F.R.C.S., Eng.; Adelaide.
46. Bothriocephalus Liguiloides, the cause of certain abdominal tumours and their surgical treatment. Walter W. Spencer, M.R.C.S., Eng.; Bathurst.
47. Treatment of Ruptured Pulmonary Hydatids. R. Humphrey Marten, M.B., Camb.; B.C., Cantab.; M.R.C.S., Eng.; L.R.C.P., Lond.; Adelaide.
48. On Hydatids. J. B. Ross, M.D., Wurzburg, Warnambool.
49. A rare Situation for a Hydatid Cyst. C. F. Eichler, M.R.C.S., Eng.; M.D., Heidelberg; Sydney.
50. Exhibit of Casts of Club foot cases. F. Milford, M.R.C.S., Eng.; L.R.C.P., Lond.; Sydney.

SUBSECTION—DISEASES OF THE NOSE, THROAT, AND EAR

1. Post Nasal Growths. James W. Barrett, M.D., Ch.M., Melb., F.R.C.S., Eng.; Melbourne; and Percy S. Webster, M.D., Durham; M.R.C.S., Eng.; Melbourne.
2. Nasal disease as a causal factor in affections of adjacent parts and distant organs. C. H. Smith Hozier, F.R.C.S., Irel.; Sydney.
3. Thyrotomy for Papilloma of the Larynx in young children. Alfred A. Lendon, M.D., Lond.; Adelaide.
4. On Adenoid Vegetations. W. F. Quaife, M.B., C.M., Glas.; Sydney.
5. On a form of Senile Otasthenia. W. F. Quaife, M.B., C.M., Glas.; Sydney.
6. Notes on Adenoid Vegetations in the Nasopharynx, with special reference to the form of deafness connected with their presence. John Lockhart Gibson, M.D., C.M., Edin.; M.R.C.S., Eng.; Brisbane.
7. Case of Parasitic disease of the throat with exhibition of patient. James A. Dick, M.D., Edin.; Windsor.
8. "Hypertrophy of the Lingual Tonsil." T. K. Hamilton, M.D., Dub. F.R.C.S.; Adelaide.
9. Notes on a Combined Vapour Inhaler and Tympanum Inflator. H. Paynter Sloggett, L.K.Q.C.P., Irel.; Dipl. State Medicine; M.R.C.S., England; Melbourne.

SUBSECTION.—DISEASES OF THE EYE.

1. Notes on the practical use of the direct method for estimating refractive Anomalies. John Lockhart Gibson, M.D., C.M., Edin., M.R.C.S., Eng.; Brisbane.
2. A dropping of watery fluid from the nose, associated with Optic Neuritis. F. Wallace Mackenzie, M.B., C.M., Edin.; Wellington, N.Z.
3. An operation for Pterygium. Thomas Evans, M.R.C.S., Eng.; Sydney.
4. Cases of Dot Cataract and
5. Case of Tumour of the Optic Nerve and
6. Case of Paralysis of the third nerve from myxoma of the nostril. T. K. Hamilton, M.D., Dub., &c.; Adelaide.
7. Cases of Congenital Defects. W. Odillo Maher, M.D., Q.U., Irel.; Sydney.

SECTION III.—MIDWIFERY.

1. Treatment of the Inflammatory Diseases of the Uterus and Appendages. Walter Balls-Headley, M.D., Camb., F.R.C.P., Lond.; Melbourne.
2. A novel Method of Operating for the Cure of Large Ventral Hernia; with notes of a Successful Case. R. D. Pinnock, M.D., Glas.; Ballarat.
3. Palpation Obstetrical. Jas. A. Dick, M.D., Edin.; Sydney.

4. Some Questions affecting Obstetric Practice. W. Camac Wilkinson, M.D., Lond., M.R.C.S., Eng., &c.; Sydney.
5. Note on Protracted Gestation. Geo. H. MacSwinney, M.D., Q.U., Irel.; Sydney.
6. Ovarian Abscesses producing Symptoms leading to a Diagnosis of Early Ectopic Gestation. Geo. Cleghorn, M.D., Durham, M.R.C.S., England; Blenheim, N.Z.
7. Notes on
 - (a) Ectopic Foetus of the Fifth Month, Removed by Abdominal Section.
 - (b) Ectopic Foetus Passed Full Term Removed by Abdominal Section during a Superadded Normal Pregnancy. Ralph Worrall, M.D., M.Ch., Q.U., Irel.; Sydney.
8. Dilatation and Curetting of the Uterus. J. A. G. Hamilton, M.B., Dub., &c.; Adelaide.
9. Model of a Gynecological Conch. L. W. Bickle, L.R.C.P., Lond., M.R.C.S., Eng.; Mount Barker, S.A.
10. Note on Trendelenburg's Position, with Exhibition of Krug's Apparatus. R. Worrall, M.D., Q.U., Irel.; Sydney.
11. Fibro-Cystic Disease of Uterus in Process of Expulsion: Hysterectomy—Exhibit. Joseph Foreman, L.R.C.P., Eng., M.R.C.S., Eng.; Sydney.
12. Some Points Bearing on Vaginal Hysterectomy. E. T. Thring, F.R.C.S., Eng.; Sydney.
13. Notes on a Specimen of Intra-peritoneal Rupture of Extra-Uterine Foetation—Laparotomy. R. Humphrey Marten, M.B., Camb., M.R.C.S., Eng.; Adelaide.

SECTION IV.—PUBLIC HEALTH.

1. Notes on Worm-nests occurring in the Cellular Tissue of the Brisket of Cattle. John Gibson, M.D., Ed.; Windsor.
2. Notes on the Diseases of Queensland for the years 1887-1891 in relation to Atmospheric Conditions. David Hardie, M.D., Aberdeen; Brisbane.
3. Notes on the Demography of North Queensland. J. Sydney Hunt, M.R.C.S., Eng.; L.R.C.P., Ed.; Hughenden, Queensland.
4. Registration of Still Births and Protection of Infants. George Lane Mullins, M.D., T.C.D.; Sydney.
5. Diseases of Samoa. Rev. S. H. Davics, L.R.C.P. and S., Edin.; Samoa.
6. Public Health. Andrew Ross, M.D., Glas.; Molong, N.S.W.
7. (a) The Course and Cause of Influenza. (b) The Meteorological Aspect of Typhoid Fever. T. G. Carstairs, M.D., Edin.; Geelong, Victoria.
8. Sewers and no Sewers: Experiences in the Eastern Suburbs of Sydney. F. H. Quaife, M.D., Glas.; Woollahra.
9. Leprosy in Queensland. Joseph Bancroft, M.D., St. Andrew's; Brisbane.
10. Charlatanism in relation to Disease. F. Truby King, B.Sc., M.B., Edin.; Otago, N.Z.
11. Some Remarks on Tubercular Phthisis. G. L. L. Lawson, M.R.C.P., Edin.; M.R.C.S., Eng.; Gosford, N.S.W.
12. Statement concerning the Number and Nationality of Lepers received at the Lazarets on Daymen and Friday Islands since their Establishment. A. E. Salter, M.B., Ch.B., Melb.; Thursday Island.
13. Insanity in its Relation to the Law. F. Norton Manning, M.D., St. Andrew's; M.R.C.S., Eng.; Sydney.
14. Statistics of Insanity in New South Wales in Relation to the Census of 1891. Chisholm Ross, M.B., Edin.; M.D., Syd.; Newcastle.
15. On the Plea of Insanity in Criminal Trials. J. W. Springthorpe, M.D., Melb.; M.R.C.P., Lond.; Melbourne; and W. L. Mullen, M.D., Melb.
16. Idiocy and Juvenile Insanity in Victoria. J. V. McCreery, L.R.C.S., Irel.; Kew.
17. Clinical Notes on a Case of Hydrocephalic Idiocy. John Steell, M.B., Edin.; Kew.

18. Premonitory Symptoms of General Paralysis. E. E. Rosenblum, M.B., Ch.B., Melb., Yarra Bend.
19. On Five Cases of General Paralysis. Herbert Macandrew, M.B., Ch.M. Edin.; Hokitika, New Zealand.
20. On Poisoning caused by Canned Provisions. William M. Hamlet, F.I.C., F.C.S., Government Analyst, Sydney, N.S.W.
21. A New South Wales Life Table. T. A. Coghlan, Government Statistician, N.S.W.

SECTION V.—ANATOMY, PHYSIOLOGY, PHARMACOLOGY, AND PATHOLOGY.

1. Observations on the Normal Position of the Vermiform Appendix. G. E. Rennie, M.D., Lond.; and Cecil Purser, M.B., Ch.M., Syd.; Sydney.
2. Recent Progress in Microscope Construction, with Demonstration of Modern Microscopical Apparatus. Gustav Lennhoff, M.D., Berlin; Sydney.
3. Two Cases of Congenital Malformation of the Heart. John Morton, M.B., Ch.M., Syd.; Demonstrator of Anatomy, Sydney.
4. On the Closure of the Central Canal in the Spinal Cord of the Foetal Lamb. J. T. Wilson, M.B., Edin.; Sydney.
5. On a Series of Varieties in Human Anatomy. J. T. Wilson, M.B., Edin.; Sydney.
6. Demonstration of Dwarf Skeleton by Dr. Poulton (for Professor Watson, of Adelaide), and of another case of Dwarf Skeleton.
7. Notes on the Functions of the Thyroid Gland, with Observations on a Case of Thyroid Grafting. J. Lockhart Gibson, M.D., C.M., Edin.; M.R.C.S., Eng.; Brisbane.
8. The Effect of Food on the Secretion of Bile in Man, with an Analysis of Human Bile. C. S. Martin, M.B., B.Sc., Lond.; M.R.C.S., Eng.; Demonstrator of Physiology in the University of Sydney; Sydney.
9. Demonstration of Physical Models. T. P. Anderson Stuart, M.D., Edin.; Sydney.
10. Method of Practical Pathological Teaching in the University of Melbourne. H. B. Allen, M.D., Melb.; and T. Cheney, M.B., Melb.; Melbourne.
11. Notes on a Case of Pernicious Anæmia. J. Lockhart Gibson, M.D., Edin., &c.; Brisbane.
12. Healed Pulmonary Consumption. G. E. Rennie, M.D., Lond.; Sydney.
13. Cholera and its Diagnosis by Bacteriological Tests; Evening of Conversazione. W. Camac Wilkinson, M.D., Lond.; M.R.C.P., Lond.; Sydney.
14. Bacteriological Exhibits. W. Camac Wilkinson, M.D., Lond.; assisted by Veterinary Surgeon Park, Tasmania; Mr. McGarvie Smith, and Mr. Ponnd.
15. Notes on a Case of Congenital Stricture of the Oesophagus, by R. Humphrey Martin, M.B., Camb., &c.; Adelaide.

Intercolonial Medical Congress of Australasia.

THIRD SESSION.

Inaugural Meeting—Monday, September 26th, 1892.

THE third session of the Intercolonial Medical Congress of Australasia was inaugurated on Monday, the 26th September, 1892, in the Great Hall of the University of Sydney. His Excellency the Earl of Jersey, G.C.M.G., Governor of the Colony of New South Wales, arrived at 11 o'clock a.m., and was received and escorted to the dais by the President and other officers of the Congress. There was a large attendance of members of the Congress and of other ladies and gentlemen. On the dais were seated His Excellency the Governor, the President of the Congress (Dr. P. Sydney Jones), the Hon. Sir George R. Dibbs, K.C.M.G. (Premier), the Hon. T. M. Slattery (Minister for Mines), Sir Alfred Stephen, G.C.M.G., C.B., Sir Henry Parkes, G.C.M.G., Sir William Manning, K.C.M.G. (Chancellor of the University), the Primate (Dr. Saumarez Smith), Professor Allen (Melbourne), Sir Alfred Roberts, Dr. F. Norton Manning, Professor Anderson Stuart, and Dr. S. T. Knaggs (Joint General Secretaries), the Hon. Dr. Creed, M.L.C., the Hon. Dr. Norton, LL.D., Dr. Verco, of Adelaide (President of the first Congress), the Dean of Sydney, Herr Pelldram (German Consul), Professor MacCallum, Canon Sharp, Principal Kinross, the Very Rev. Dr. O'Brien, Mr. Critchett Walker, C.M.G., and many others. The President (Dr. P. Sydney Jones) took the chair, and invited His Excellency the Governor to formally open the Congress.

THE GOVERNOR'S ADDRESS.

His Excellency the GOVERNOR was received with cheers, and said: Mr. President, Ladies, and Gentlemen,—Before I declare the Congress opened, before the more serious work of the Congress begins, I should like to take the pleasure of bidding a hearty welcome to all its members gathered in this University. There are gathered underneath this roof men of that great science to which all men some time or other turn with many feelings of hope, and at other times with fear, and always with gratitude. We wish you a hearty welcome, and hope you will enjoy the charms of our beautiful Sydney as an Australian's privilege. As we take a glance down the agenda paper we see there are many subjects of great importance which will be discussed—subjects which have for their object not merely the state of our complex human form, but also other matters of scientific research. And it cannot be a matter of surprise or of wonder that the public at large should take the greatest interest in the development of medical science. Almost every day some new discovery is made—some new advance is secured.

Occasionally the world is shocked by the discovery of a new disease; but then it is immediately cheered by the announcement of fresh remedies. And so continually the hunt after germs and baccilli goes on with unabated vigour and unabated skill. And I suppose Æsculapius, Galen, or Paracelsus would hardly know their art in its present aspect. Times have greatly changed since it was considered necessary to hang red curtains around the bed of a patient suffering from scarlet fever. And it is also recorded that on one occasion the reverend canon of a cathedral arranged with Paracelsus to pay him 100 florins to effect a cure. I am afraid the reverend canon was suffering from gout. When the canon was cured and the bill was presented, the canon refused to pay. And the Court decided that he ought only to pay the value of the medicines he had taken. As probably the water cure was applied on that occasion the value was not very great, so Paracelsus was very disgusted. Fortunately that rule has not become law, otherwise I am afraid it would have a very bad effect upon some patients, and also a very depressing effect upon some of the temperance reformers. But if we consider the great change that has taken place in our own time and the enormous payments that have been made to Sir Morell Mackenzie and Sir Spencer Wells, we realise that the world—the public—has come to the conclusion that it is far better to pay for quality and not for quantity. I think this is a suitable occasion on which to testify our great admiration of one of the finest traits in the character of medical men. The splendid hospitals which we have in our cities, and the smaller but equally useful buildings we have in less populated towns are daily the scenes of the spirit of their unselfishness, and it is impossible to speak too highly of services they render and the kindness they exercise in those hospitals. The public and the community at large will, I feel sure, be always ready to extend their thanks to the members of the medical profession who help in this direct and useful manner. Speaking of hospitals compels me to say one word with regard to the magnificence of some of our hospitals. I do not for a moment say one word against the splendid buildings erected by the munificence of the community, but I think it is worth while considering whether we should build all our hospitals on the same gigantic scale, and whether it would not be as well to have some hospitals built in a less pretentious style, so that it would be possible after the lapse of a certain time to pull them down and erect other buildings somewhere else, and thus avoid the dissemination of diseases which will take possession of the ward of a hospital which has been used for a long time. I saw two instances of this kind in India in the large towns of Jeypore and Delhi. In both cases the Indian potentates decided upon a change of the *locale* of their towns—partly because they thought the people had been living there too long; partly, perhaps, for political reasons; and, perhaps also because, it was suggested, they were inclined to speculate in land to make their land more valuable. But whether it was in the spirit of the sanitary reformer, or in that of the land speculator, I do not think I need stop to discuss at this moment, especially as there are instances in which large towns have been moved to the great benefit of the people. It is a very curious thing that of Delhi there are remains of no fewer than three old towns, and the present one is still flourishing. Remember the time will come when this also will have to be removed. Well, we have in Sydney two instances of the different views taken in regard to this matter. One in the splendid hospital with which is associated the name of Sir Alfred Roberts, and the other is the Little Bay Hospital. Now, I do not wish to praise one more than the other, but I do think that they represent two views, which may be carefully considered by gentlemen belonging to the medical

profession. Well, there is another subject down for discussion—the question of public health, which is one of the most important that can occupy the attention, not only of members of the medical profession, but of the public at large, and especially of statesmen. If we make the conditions under which the masses of the people live more healthy, we may be quite sure we do something to make them more happy. And in these days, when there is a great tendency on the part of the people to congregate together in populous centres, it is most essential that the directors of public affairs should take care that the conditions under which they live are not conducive to illness. Also it is necessary that we should be very particular in preventing the contamination of our water supply, and that measures be taken to prevent the bringing in of diseases from abroad, and if they unhappily gain a foothold that their area should be circumscribed. And surely in Australia this subject is of vital importance. The cablegrams from the old world have told us of that great disease which has been creating such sorrow in the town of Hamburg—a town which, in regard to smells, has in the past been able to beat even the historic town of Cologne. Now, unfortunately, the people of Hamburg are reaping the evil of allowing their town to exist in an insanitary condition. We here ought to be specially careful, and whilst we have time ought to take care that conditions like those shall not be reproduced in Australia. But it is not for me to make a long speech on this occasion. There are many subjects on which difference of opinion will arise, but I intend to be perfectly impartial. I hope the result of this Congress will be the elucidation of many difficult points, and the solution of many disputed problems. I think that those who have come from the neighbouring colonies will be able to see in Sydney many things with which they will be pleased; we, at any rate, are proud of them. There are first-class hospitals here, and I think we may boast that we have a medical school which, under the inspiring influence of Professor Anderson Stuart, can vie with the whole world. Mr. President, I should just wish to express my congratulations to you upon having been chosen to preside over this important Congress. It must be a proud thing for you to preside as the head of a body of great men and the great science to which all men owe allegiance, I hope you will have a bed of roses without any thorns. That is not always the case with the president of a Congress. I feel quite sure, in bidding welcome to our friends, I may say that when they put their fingers on the pulse of Sydney they will find it respond with an even and a healthy beat to every sentiment of kindness and hospitality. I now declare the work of the Congress begun.

The PRESIDENT called upon Professor Anderson Stuart, M.D. (one of the General Secretaries of the Congress), to read the report of the Executive Committee, which was read as follows:—

REPORT OF THE EXECUTIVE COMMITTEE.

May it please your Excellency, Mr. President, members of the Congress, ladies and gentlemen,—

We have the honor to report that at a special meeting held during the second session of the Intercolonial Medical Congress, in the Wilson Hall, University of Melbourne, on Saturday, 12th January, 1889, to determine the place and time of the next meeting, and to elect a president for the next session, the following resolutions were passed:—1. "That the third session of the Intercolonial Medical Congress to be held in Sydney in the year 1892, or at such earlier period as the Medical Societies of New South Wales may determine." 2. "That Dr. MacLaurin, the medical adviser to the Government of New South Wales, and President of the Board of Health, be elected president of the third session of the Intercolonial Medical Congress of Australasia." At a meeting of the New South Wales members, held on the same day, Dr. P. Sydney Jones and Dr. Thomas Chambers

were deputed to act as joint honorary treasurers, and Professor T. P. Anderson Stuart and Dr. Samuel T. Knaggs were deputed to act as joint honorary secretaries. This Committee subsequently met in Sydney and communicated with the medical societies of New South Wales, which were requested to appoint additions to the executive committee, and to formulate a suggestion as to the most convenient date for the third session of the Congress to be held. At the recommendation of these societies several additions were made to the executive committee, and Monday, 19th September, 1892, was deemed the most convenient time at which to commence the session. Your Committee regret to state that on the 20th January, 1892, the Hon. H. N. MacLaurin, M.D., resigned the position of president of the Congress in consequence of private business of an urgent nature requiring his presence in Europe. On 26th January, at a special meeting of the executive committee, P. Sydney Jones, M.D., Lond., F.R.C.S., Eng., was appointed president of the Congress, and accepted the position. Dr. Thomas Chambers consented to act as sole honorary treasurer. Their Excellencies the Governors of all the Australian colonies, His Excellency Rear-Admiral Lord Charles Scott, Commander-in-Chief of the Australian Station, the Administrator of the Government in New Guinea, and Sir Alfred Stephen have been invited to become patrons of the Congress, and have graciously consented to do so. Application was made to the Senate of the University of Sydney for the use of the buildings and grounds of the University during the sitting of Congress, and the application was granted, the University in this way largely contributing to any success which may be credited to the work of the Congress. Communications were entered into with the principal members of the profession in all the other Australian colonies who had interested themselves at the previous meetings of Congress, with a view of selecting and appointing presidents and vice-presidents of the various sections into which the Congress divided. As a matter of courtesy and usage adopted in previous Congresses, these officials were selected from members of the profession residing in the other colonies than that wherein the meeting of Congress is held. In nominating some of the vice-presidents of the Congress the Committee took into consideration the earnest and useful work done by the past presidents and local secretaries of the previous sessions of Congress, and passed a resolution appointing them to that distinguished position. Your Committee regrets that exception has been taken to its action in certain particulars. It has been arranged to discuss the matter at a general meeting of the Congress to be held here this evening, at 8-30 o'clock. There are about 560 members on the roll of the Congress, made up as follows:—Sydney, 208; New South Wales (outside Sydney), 111; Victoria, 131; South Australia, 39; Queensland, 32; New Zealand, 12; Tasmania, 11; Samoa, 1; New York, 1.

Dr. VERCO (Adelaide), president of the first Congress, moved the adoption of the report.

The motion was seconded by Dr. BRIGHT (Hobart) and carried unanimously.

The President then invited the Hon. Sir George R. Dibbs, K.C.M.G., Premier of the Colony of New South Wales, to address the meeting.

THE PREMIER'S ADDRESS OF WELCOME.

Sir George R. DIBBS, who was loudly cheered, said,—Your Excellency, Mr. President, Ladies and Gentlemen—After the excellent speech which His Excellency has delivered, welcoming the Congress to the Colony of New South Wales, it appears hardly desirable that I should occupy your time by saying any words to you, but I should like to say that it strikes me as being a most pleasing circumstance that amidst all the turmoil and storm socially, commercially, and politically, so large a number of medical men should have left their avocations in every colony to meet in Congress for the discussion of so many questions affecting the welfare of humanity as are embraced in the programme. So far as New South Wales is concerned, we have been endeavouring, through the Legislature, to improve the health of our people. During the last three or four years we have passed a bill to regulate the dairies. At first we met with a considerable amount of opposition, and we were charged with interfering with the liberties of the dairymen, but when it was discovered that a proportion

of the milk consumed in the city came from the "cow with the iron tail"—and that the water supply of some of the dairies was of a character to spread disease, and thus many valuable lives were lost, and when it was proved, moreover, that in one district no fewer than 140 cases of typhoid emanated from one dairy, the opposition was withdrawn and the bill was allowed to become law. That law is now in operation in many parts of the Colony. Only last session we passed a very useful measure also affecting the public health. I refer to the Act providing for the inspection of cattle and the destruction of such as may be suffering from cancer. Under the provisions of that Act a large number of diseased cattle have been destroyed which but for it would have been consumed by the people of Sydney. During my short tenure of office I have to a large extent endeavoured to make a hobby of matters of health. Some four or five months since I gave authority to Dr. MacLaurin to inquire from one end of the United Kingdom to the other, over the Continent, and in America for the purpose of gathering together materials which will be of service in the preparation of a comprehensive Health Act. He is gathering an immense amount of information, and is securing the assistance of the Colonial Office in regard to visiting the public institutions of England, with a view to giving us full advantage of his studies. Other questions which should occupy the attention of the Legislature are the adulteration of food and public drunkenness. Dr. MacLaurin is engaged in seeing whether it is possible, by the erection of inebriate asylums, to put down drunkenness and save lives. I notice from your programme that the subject of public health is to be discussed. I feel certain that great good will result from the discussion of that subject by so large a number of able gentlemen as are embraced in the Congress, and who have left their own colonies and their own professional spheres for a time, so that they may discuss various subjects collectively, and arrive at a result in regard to which the public will be the gainers. We have made strides in many directions, and especially has that been the case in completing, under the advice of Dr. Mackellar, one of the best establishments any country ever possessed for the isolation of disease. I allude to the establishment at North Head, which I believe the visitors are to be taken over. I will not say anything more, but second His Excellency's cordial welcome to the members of the Congress. We hope that your labours will prove of enormous benefit to the public, to the improvement of the sanitary condition of the colonies, to the saving of human life, and to the relieving of suffering humanity. So far as my position enables me to do so I offer you, on behalf of the Government of this Colony, and the Colony as a whole, a hearty welcome.

THE PRESIDENT'S INAUGURAL ADDRESS.

The PRESIDENT (Dr. P. Sydney Jones), then delivered the following inaugural address:—

Your Excellency, members of the Congress, Ladies and Gentlemen,—My first duty is to thank the representatives of Her Majesty in this and the neighbouring colonies for bestowing their patronage on the Congress, and your Excellency in particular for coming here to-day to open this session of Congress; my next is to explain how I come to occupy this chair. As is known to most of you, three years ago at our meeting in Melbourne, the Honorable Dr. MacLaurin, at that time Medical Adviser to the Government of this Colony, was appointed President of this session. Last March urgent private affairs called Dr. MacLaurin to England, and the provisional Executive Committee did me the honour to ask me to fill the vacancy thus created.

This, after mature deliberation, and not without much misgiving as to my fitness for the office, I consented to do, and my appointment was subsequently confirmed at a meeting of the New South Wales members of Congress. I should not have accepted the position had I not felt confident of your generous sympathy and co-operation in the difficult task which lies before me. Lastly, it is my pleasing duty, in the names of the New South Wales members of Congress, to tender a hearty welcome to this city to all of you who have come from Europe and the neighbouring colonies. We trust that your visit here will prove to be both profitable and pleasant, and that you will return to your respective spheres of labour refreshed in body and in mind, and with higher aspirations to advance the interests of the noble profession to which we have the honour to belong. The meetings of this Congress afford opportunities, not only for the fuller and wider discussion of questions of mutual interest, but for the cultivation of those personal relations which aid so powerfully in harmonising views and in stimulating concerted action for the advancement of our art. It has been a difficult task to decide upon a subject on which to address you. My predecessors in this chair have covered most of the ground which one would naturally select. They have discoursed upon the diseases which are of greater prevalence in this Southern land than in more northern latitudes; upon the modifications of disease brought about by our climate, and the wide field open to us in elucidating its pathology; as well as upon the possible therapeutic properties of our vast flora and mineral springs. But they, with perhaps commendable modesty, refrained from enlarging upon the advances made in the prevention and treatment of disease throughout the civilised world. It is seldom fitting, indeed, for the disciples of any art to proclaim to the world the progress which they have made—the progressive nature of the work done being in itself, as a rule, the best evidence of the fact. There are, however, occasions (and the present, I think, is one of them) on which it is both useful and becoming to ask ourselves the question, What advances have we made? There are sceptics within as well as without our ranks, and if the consideration of this question should serve to rescue one only of our number from the benumbing effect of doubt and the paralysis of action which accompanies it, we shall not have spoken in vain. A sceptical mental attitude is fatal to the high ideal and hopeful aspiration which we must possess if we are to make any real progress. Moreover, as in the life of every thoughtful man, there are halting times in which, reviewing the past and carefully considering his present condition, he determines upon his future course of action, so should there be in the life of the body corporate occasions on which it should pause and look back upon the way which it has travelled, note the tempting byways of progress which have been vainly followed, the mistakes into which it has fallen, and the victories which it has achieved; and from all these considerations deduce principles for its future guidance. My subject, then, is a very practical one, viz., “The Progress of the Healing Art during the last Forty Years.” I have limited my view to this period of time, because it covers my personal experience, it being exactly forty years this month since my name was placed upon the roll of students at University College, London. Some of my remarks will be autobiographical. My motive in introducing them will, I feel sure, not be misunderstood. They may help to give some slight interest to what, I fear, will otherwise prove to be a very dry address. The progress of medicine is intimately affected by the progress of almost all the sciences, for it is one of the glories of our art that nearly all the sciences are tributary to it. In the eloquent and poetic language of James Hinton, at once philosopher and surgeon,

“Not only chemistry, botany, zoology—these have been long its servants—but new domains of physics, molecular and other, of the science of electric currents, and of heat; problems of the first dawns of life—for the question of the dependence of putrefaction upon the presence of germs owes its interest and its passionate pursuit to medicine—are drawn into the widening vortex of our studies. Further still, the structure of the earth is bidden to reveal what part it plays in the production of disease; nor does the geologist touch a stratum too deep or too remote for the physician to have an interest in his researches. The explorers of the deepest sea bottom aid him in the study of respiration; the student of storms for him discovers ozone; and the spectroscope, we may be sure, will not have done its work till the study of the remotest star lays its offering at the feet of the healer of disease. We have—or, in the person of the physician of the future, shall have—an interest in the colours Sirius flashes back to the patient eye of the astronomer; for they will teach us something more of the planet upon which we dwell. Nay, the Milky Way itself becomes our servant, and holds up before us in its forms of beauty, winding in spiral clusters through infinitude the very image of the living forms we question with half hopeless curiosity beneath the powers of our microscopes.” It would, however, be impossible in the short space of time allotted to this address, even to enumerate the advances made in the collateral sciences. I can only speak briefly on the progress of some of those which are more immediately connected with our art, and which are, indeed, its foundation. Here, perhaps, I shall be met with the objection that therapeutic medicine has no scientific basis—that it is entirely empirical. Now, we must all admit that our treatment of disease is not always as precise and rational as we could desire; but that empiricism, and what Professor Gairdner so aptly terms the “automatic method,” which recognises only the disease and its assumed antidote, has given place very largely and rapidly to treatment founded on sound scientific principles, deduced from the study of chemical, physiological, and pathological processes, is indisputable. Our calling has long ceased to be open to the charge brought against it by Voltaire, when he cynically remarked that, “the art of medicine consists in putting a number of drugs of which one knows little into a body of which one knows less.” Moreover, successful methods of treatment, formerly regarded as of a purely empirical character, have been shown by fresh advances in biological science to be perfectly rational. For instance, the success of the old practice of drawing a stick of lunar caustic around and a little beyond the edge of a patch of erysipelatous inflammation with a view to check its spread is now explained by the increased quantity of blood, and therefore of leucocytes brought to the part so cauterised; the white cells concentrating their forces like a defensive army devour the erysipelatous streptococci, and thus stay their onward and destructive progress. To some degree, indeed, the healing art must always remain partially empirical, or, at any rate, until psychology has become an exact science, for there is a factor in every case of disease which the most complete knowledge of the structure and functions of the body and of the action of medicines cannot explain. I mean the *ego*—the individual. As Amiel so well observes, “Every illness is a factor, simple or complex, which is multiplied by a second factor, invariably complex—the individual; that is to say, who is suffering from it, so that the result is a special problem, demanding a special solution, the more so the greater the remoteness of the patient from childhood or from country life.” The influence of the mind over the body, of the mental and spiritual over the physical nature, cannot be weighed in scales or reduced to its elements in a crucible; but it is a potent influence, nevertheless, and

the wise physician takes it into account in the treatment of his patient. But to turn now to my retrospect. The teaching of general Anatomy was, probably, as perfect in my student days as it is now, and under the able guidance of such accomplished anatomists as Ellis and Holden, it was our own fault if we did not acquire a very thorough knowledge of the coarse anatomy of the human frame. It was far otherwise, however, with microscopic anatomy, which was then only in its infancy. Owing in great part to the improvements effected in the manufacture of lenses, in the making of sections, in staining and mounting specimens, our knowledge of histology has made marvellous strides. An entirely new world has been opened up to the student who has the diligence to investigate it. The same may be said of Physiology. Our knowledge of the functions of the organs and tissues of the body is now far wider and more precise. In proof of this need I do more than remind you how largely the functions of the nervous system have been elucidated by the experiments of Ferrier, Horsely, and others and the accurate clinical observations of such men as Hughlings Jackson, and Gowers, to mention only British observers. Forty years ago we knew comparatively nothing of the nervous centres regulating the movements and functions of different parts of the body, and, consequently, were quite unable to localise, with anything like accuracy, lesions of the brain and spinal cord. To-day we can—in many cases with absolute certainty—point out the exact seat of a growth, abscess, or other morbid process, and perform the appropriate operation for its removal. Quite recently the researches of Arthus and Pages, of Wooldridge and Wright have shown that the coagulation of the blood outside the body may be arrested by precipitating its lime salts in the form of insoluble oxalates, and may be reinstated by the addition of calcium salts. The important bearing which this observation has upon the operation of transfusion is manifest. The control of the process of coagulation also within the body which this discovery holds out a hope of securing will, should it be realised, enable us to deal effectually with such morbid conditions as internal hemorrhage, aneurism, and hæmophilia. Chemical science, likewise, has contributed largely to our means of combating disease. A more complete knowledge of the chemistry of the organic and inorganic world has furnished us with remedies which were unknown in my student days, and has enabled the pharmacist to give us both old and new remedies in a small compass and in an attractive form. Contrast the boluses and nauseous potions of our fathers with the compressed tabloids, the liquid extracts, and the concentrated tinctures of to-day. The ingenuity of our time displayed in contriving means for concealing the disagreeable taste of medicines, and for preventing the decomposition of incompatible drugs, is indeed marvellous. The capsules, the cachets, the palatinoids and bi-palatinoids are all inventions of recent times. Simply to enumerate the discoveries which have been made in Pathological science during the last forty years would exhaust your patience. Their practical importance cannot be over-estimated, correct diagnosis being dependent upon sound pathological views, and successful treatment upon correct diagnosis. Since Obermier in 1868 discovered the bacillus of relapsing fever, bacteriological science has made unprecedented progress. The specific bacilli of tuberculosis, of typhoid fever, of diphtheria, of leprosy, of tetanus, of malignant pustule, have been isolated and described, and quite recently the bacillus of influenza has been discovered. It is true that in only a few cases have these diseases been clearly proved to depend upon the presence of a specific microbe, and that in some of the specific fevers, typhus, small-pox, and measles, for instance, none have been discovered; nevertheless, the

presence of a particular parasite, and the invariable reproduction of a disease by inoculation with its virus, makes it highly probable that the bacillus and the disease stand in the relation of cause and effect. We are not yet able to battle with tuberculosis, with tetanus, and other bacillary diseases in the way so successfully done with anthrax and hydrophobia, but there are not wanting indications that they will yet be overcome by methods founded on a knowledge of the life history of these minute but numerous and powerful enemies of our species. Bacteriology has before it a great future in its application to preventive as well as to curative medicine, and I am proud of the fact that one of our wealthy citizens, and a Fellow of the Senate of our University, recently deceased, left a large share of his fortune to this University for the teaching and prosecution of this branch of science. One of the most interesting problems engaging the attention of pathologists at the present time is the manner in which the system resists the attacks of bacilli. That the white cells of the blood do offer battle to the invading bacilli is a recognised fact, since they have been seen to devour them, but whether that is the manner in which they are destroyed, as maintained by the phagocytists, or whether the plasma of the blood is the active agent in their destruction, as asserted by the humoralists, is yet undecided. The light thrown upon the pathology of myxœdema, of actinomycosis, of ulcerative endocarditis, of multiple neuritis, the differentiation of sarcoma and carcinoma, the recognition of lupus as a tubercular disease—these and many other discoveries in pathological science are the result of researches prosecuted within the last quarter of a century. Having thus rapidly glanced at some of the advances made in the knowledge of the sciences directly related to our art, let us now see if we are better able to cope with the ailments to which the human frame is subject. There is little doubt that the most important surgical advances of the last half-century are the result; first of a wider recognition of the importance of the principle of mechanical and physiological rest, a recognition which we owe chiefly to that philosophic surgeon, the late John Hilton; and secondly, to the introduction of the antiseptic method, for which we are indebted to the genius of Lister. The amount of pain prevented and the number of lives saved by the observance of these two principles in our surgical procedures is incalculable. Contrast the issues, the setons, the moxas, the hot irons which were employed by our fathers in the treatment of (say) tubercular disease of joints, with the present methods of dealing with those painful affections, and the truth of the above affirmation will be evident. To enable my younger surgical brethren to realise how largely these principles were neglected, and how wide is the difference between the conduct of a surgical operation at the present day and the procedure followed even thirty years ago, I shall briefly refer to two of my earliest operations. The first case which I shall mention was one of compound comminuted fracture of the leg, and amputation of the thigh was necessary. The limb was washed, but no special precautions were taken to make it surgically clean; my hands and those of my assistants were not thoroughly disinfected: the coats which we wore were left-off frock or overcoats, which had seen much service, and were much bespattered with blood and pus, if not something even more noxious. The nurses were uneducated and untrained, some of them being of the "Sairey Gamp" type. They wore stuff dresses, which, perchance, had been in contact with the bodies of patients suffering from contagious diseases. The instruments were fairly clean, but no antiseptic fluid or sterilised water was at hand in which to immerse them. In short, we were ignorant of the existence of septic germs, and therefore used no means to exclude or destroy them.

Koebele's or Spencer Wells' pressure forceps had not been invented, and we had therefore no rapid means of arresting hæmorrhage as the steps of the operation were completed; the sponges had done service on many similar occasions, and no measures beyond ordinary washing had been used to purify them. We had no catgut or other absorbable ligatures, and I was therefore compelled to leave the silk ligatures hanging out at one angle of the wound, offering thereby an obstacle to primary union, favouring the formation of a suppurating track, and seriously increasing the risks of septic absorption. Water dressings were applied, thus further adding to the chances of pyæmia. The necessity of frequently changing these dressings involved constant disturbance of the stump, gave the patient pain, and retarded the healing—another illustration of the manner in which the principle of rest to an injured part was violated. Contrast this picture with that with which we are all familiar at the present day—the thorough cleansing of the skin rendering it absolutely aseptic; the preparation of the hands of the surgeon and his assistants and their spotless white linen coats; the perfect antiseptic precautions in every particular; the intelligent nurses in their washing dresses, white caps and aprons; the instruments immersed in some antiseptic fluid, or at any rate, in sterilised water; the pressure forceps; the absorbant wool sponges; the drainage tubes; the absorbable ligatures; the dry absorbant dressing needing to be changed but rarely, and thus securing the utmost degree of mechanical rest to the stump. The second case was one of ovariotomy, and was performed at a date when our knowledge of the operation in this colony was derived solely from books. Surgeons were by no means agreed as to the best method of dealing with the pedicle, and the battle raged between those who advocated the use of the clamp and those who pronounced in favour of the ligature; these last, again, being divided in opinion as to whether the ends of the ligature should be cut off short and dropped into the peritoneal cavity, or left long and brought outside the body. The encapsulation of silk ligatures was then a matter of doubt, Listerism was unborn, the value of the drainage tube was not known, and the necessity for absolute cleanliness was not fully recognised. At the present day all these questions have been settled, definite rules for our guidance are laid down in the text books, and the steps of the operation are performed with almost undeviating uniformity. Time would fail me to particularise other advances in surgery which the past four decades have witnessed. I can only enumerate some of the more important:—Aspiration for diagnostic and curative purposes, incision and drainage of hydatid cysts and suppurating cavities, removal of tumours from the brain and spinal cord, gastrotomy, and the various forms of enterostomy; cholecystotomy, nephrectomy, hysterectomy, Bigelow's method of performing lithotripsy (many of these operations being designed with the object of giving a diseased organ, or part, mechanical and physiological rest); osteotomy, osteoplastic operations, skin-grafting, nerve-stretching, and suture of divided nerves. Many, indeed most, of these operations would not have been attempted but for the introduction of Listerism into surgical practice. The wide range of subjects, and the extensive knowledge required of each, has rendered necessary that division of labour which we call specialism. We have now our gynecologists, our ophthalmologists, our laryngologists, our otologists, our rhinologists, our dermatologists, our medical electricians, and some others. I am aware that much has been said and written of the danger in which the specialist stands of looking at his subject from one point of view only. But I have no fear of specialism in that direction so long as it is founded upon a sound generalism. It is dangerous only when it forgets that it is special. I must, however, leave

this subject and hasten on to show that in the domain of therapeutics we have made substantial progress; and I shall narrate my own experience in the use of a drug that is now universally recognised as of the greatest value in some forms of disease of the heart. In my student days we were taught that digitalis was a depressant of the heart's action, and should be administered only in cases of hypertrophy of that organ, and that its employment was most dangerous in cases of weak and dilated heart. In the year 1866, a near relative of my own presented all the signs and symptoms of dilated left ventricle—rapid, irregular action, feeble impulse, laboured breathing, dropsical extremities, sleepless nights—in short, the whole class of symptoms with which we are all so painfully familiar. Ammonia, ether, and alcohol were prescribed to support the failing heart, opium was given to induce sleep, these remedies at that day being recommended by all authorities. The most experienced and distinguished practitioners in this city gave me their aid and advice, but all to no purpose; my patient gradually grew worse, until it was evident to all that, having been able to procure no more sleep than a fitful doze in his chair for more than a week, the dropsy having invaded the abdominal cavity, and the bases of the lungs having become cedematous, the end could not be far off. His relatives and friends bade him good-bye, as they believed, for the last time. In this desperate condition I called to mind a paper I had seen a short time before, in which the author endeavoured to show that the orthodox view of the action of digitalis was erroneous, and that the reverse was the truth; that, in fact, digitalis was, as we now know that it is, a powerful heart tonic. After most anxious deliberation, I determined to administer the drug to my literally dying relative. I gave the first dose in fear and trembling, watching anxiously its effects. The breathing seemed to become a little easier, and the pulse a little less irregular, and after the second dose the patient sank into a deep slumber such as he had not enjoyed for many weeks. In forty-eight hours the dropsy had almost entirely disappeared, and he was able to take nourishment freely. In a week he was out of all immediate danger. Taking his digitalis mixture every few weeks he lived for eight years, and died in his 81st year. Until within a few months of his death he was able to get about and enjoy a fair measure of comfort. This is a familiar experience to the practitioner of to-day, but at the time of which I write the recovery of my patient was regarded as well-nigh a resurrection. Many other heart remedies have been introduced into practice within the last quarter of a century, and some of them are of great value, such as caffeine, strophanthus, and convallaria. The remarkable relief afforded by nitrate of amyl and nitro-glycerine in angina-pectoris is known to all. Opium still holds its ground as the most powerful of all anodynes, but a new class of analgesic and hypnotic remedies enables us to relieve the less severe forms of pain and sleeplessness with less unpleasant after effects than was formerly possible. The important class of anti-pyretic drugs is also of quite recent introduction. Formerly our means of reducing dangerously high temperatures were confined to such feeble agents as sudorifics, purgatives, and cold locally applied. Here, however, I must utter a word of caution against the unadvised use which is so largely made of these powerful narcotic remedies. Already a number of nervous and digestive ailments are traceable to the indiscriminate use of these drugs, especially by women, and unless the tide is stemmed they are more likely to prove a curse than a blessing. Two most valuable local anesthetics have been introduced into practice—cocaine and chloride of ethyl. I must not omit to mention among the new methods of treatment the Weir-Mitchell plan of isolation and feeding, by which many otherwise

hopeless invalids have been restored to health. I cannot conclude this part of my subject without a reference to the hopes that were raised two years ago that in tuberculine we had an agent destructive to the bacillus of tubercle, and a cure, therefore, for the greatest scourge of our time. Those hopes have been blighted; but there is still room for the belief that on the lines of this method of treating tubercular disease we shall yet find a germicide that will destroy the bacillus without endangering the life of its host. For the present, in Consumption we must rely on measures which owe their efficacy to the exclusion of the specific bacilli from the air which we breathe, and to the fortification of the system so that it shall be better able to resist their attacks, or, in other words, to render the soil so barren that the parasite will not grow in it. Happily for us in these southern lands we possess on the mountains and inland plains, climatic conditions which fulfil both the purposes above mentioned, and which, therefore, are highly favourable to the arrest of this disease. Forty years ago the cure of tubercular peritonitis was considered to be quite hopeless, but to-day we have records of recovery from this and other forms of tubercular disease. In the sphere of Preventive Medicine the progress that has been made is as great, or perhaps greater, than in any other department of our art, and from its nature is more open to public cognisance. For the maintenance of the body in a healthy state many things are useful, but three things are essential—pure air, pure water, and wholesome food; in one word, absolute cleanliness in its widest sense. Much has been done during the past forty years to secure to our citizens a purer atmosphere; public parks and recreation grounds—the very lungs of our cities—have been provided, sewers and mines have been ventilated, house and street sanitation has been greatly improved, smoke consumption has to some extent been made compulsory, and overcrowding has been rendered illegal. It is no exaggeration to say that tens of thousands of lives have been saved, and hundreds of thousands of cases of illness have been prevented by the Sanitary Acts; all of which have been brought into operation within my lifetime. The day is, perhaps, not far distant when, by the substitution of electricity for gas for the purposes of illumination, and gas for coal for heating purposes, by the compulsory consumption of smoke, and the destruction of refuse and noxious vapours by fire, as well as by extensive tree-planting in our streets, the air we breathe will be rendered still purer. It is to be hoped, also, that cremation of the dead will soon be universally practised; for, although it must be admitted that the return of the body to the earth is the natural mode of the disposal of the dead, yet in the artificial circumstances under which we live, crowded together in cities and towns, cremation is the only method by which we can secure pure air and uncontaminated water. There are few towns of any magnitude which do not now possess an abundant supply of pure water, but forty years ago there were many places, not only in the Australian colonies, but in Europe and America, which derived their water supply from an uncertain rainfall, collected from the roofs of houses, or, still worse, from wells which in too many instances were in dangerous proximity to cesspits or other possible sources of contamination. Lead poisoning, also, arising from the use of leaden pipes and cisterns, was quite common, but owing to the substitution of iron and earthenware cisterns and pipes for those made of lead, and to more perfect filtration plumbism is now rarely seen. I may here express the hope that in these colonies the adoption of filter beds as used by the great water companies of England will soon become general. The large amount of organic vegetable matter which many of our water supplies contain, and the animal matter which is accidentally

introduced would thus be largely removed, and the risk of the communication of zymotic and parasitic disease greatly diminished. It was in my student days that attention was first seriously directed to the adulteration of foods. The late Dr. Letheby, then Medical Officer of the City of London, and Dr. A. H. Hassall did good service in exposing the practices of dishonest tradesmen. Such necessary articles of food, as flour, bread, milk, sugar, tea and coffee, were found to be largely adulterated with noxious or innocuous substances. The appointment by the vestries and sanitary authorities of England, of medical officers of health and public analysts, together with the passing of the Food and Drugs Act, had a marked effect in reducing the frequency of these frauds. The inspection of dairies and the seizure of diseased meat exposed for sale are preventive measures of quite recent date. The communication of typhoid fever by drinking milk contaminated with sewage water was first clearly traced nearly forty years ago by my friend and tutor, Dr. E. Ballard, late of the Local Government Board. Since that time it has been one of the well recognised ways in which that great scourge of our civilisation spreads. Outbreaks of diphtheria have also been traced to the same cause. It has also been pretty clearly proved that scarlatina has been caused in the human subject by drinking the milk of cows affected by a specific disease. Moreover, there is a strong probability that not only the flesh of tuberculous cattle may communicate tuberculosis to man, but that the milk of tuberculous cows is capable of imparting that disease to children and young persons. If this be true skilled supervision of our dairies and abattoirs is a matter of vital importance. In recent times notification of disease, disinfection, isolation, and segregation have done much to prevent the spread of specific infectious diseases. Ever-increasing efforts are being made to prevent the wide-spread diffusion of the germs of disease. The study of micro-organisms has taken us a long way towards the discovery of the causes of the diseases in which they, at any rate, play a chief, if not the sole, part; and we can foresee the time when deeper biological and chemical research, and a wider acquaintance with natural phenomena and the laws which regulate them, will have conquered the whole range of the zymotic and exanthematous diseases. There are other commodities of unhappily too large consumption, the purity of which needs to be jealously watched, if it be true, as I believe it is, that intemperance in the use of beers, wines, and spirits is fostered by their adulteration. The very large proportion of disease generated by excess both in eating and drinking is one of the alarming features of our social life. I am disposed to agree in the main with Dr. Pye Smith that the malady of the century is not so much a disorder of the nerves as of the stomach, and that more of our ailments are due to errors and excesses in food and drink than to the "terrible pace" at which we live. More or less successful efforts have been made during the past four decades to protect the workmen employed in lead and arsenic manufactories from the injurious effects of those metals. Phosphorus necrosis of the jaw is also much less common than it was, owing to the greater attention bestowed upon the teeth of the lucifer match manufacturers and to the stronger insistence upon the observance of personal cleanliness. Without detracting from the merits of others, it is only just to say that in all the movements which have been made and which I have but touched upon for the bettering of the physical environment of the race, the members of our profession have, with a self-abnegation which is rarely found in other callings, taken a leading part. I cannot close these remarks upon preventive medicine without mentioning a subject which is closely connected with it. I refer to the anthropometrical system, in which a careful

estimate and record of the physical qualities of man is made, a system which has been practised in some countries on a small scale, but which it would be well, in my opinion, to carry out in all lands on a very extensive one; and, perhaps, to enforce by legislation. The physical advance or degeneration of the race would in the course of a few decades be in this way clearly demonstrated, and not be, as it now is, a matter of opinion or surmise. We should then possess precise data from which to draw conclusions as to the beneficial or deleterious influences of our habits, customs, systems of education, occupation, climate, and so forth, and we should further be aided by such data in reaching a solution of that interesting question, viz., the effect of the higher education upon the physical condition of women. Finally, your Excellency, ladies and gentlemen, the bearing of all these sanitary improvements upon the mental and moral health of the people it is not difficult to see. We cannot expect to find the *mens sana* except in the *corpore sano*. The world is better than it was in great part, because better physically, because it is cleaner. A healthier mental attitude and a higher moral tone prevail to-day; and while thankfully and freely acknowledging the large share in that improvement which is due to the school, the University, and the Church, I do not hesitate to affirm that a very considerable part must be credited to brighter and more sanitary surroundings—so much is man affected by his physical environment. There is meaning as well as wit in the saying:—

All that's great and good in men
Has its source in oxygen.

In conclusion, let me say that, although I have tried to show that our art has advanced both on its scientific and practical sides, and although I am proud of what has been done during my own lifetime, I am deeply conscious of how much we have yet to learn, and how often we stand helpless at the bedside of the suffering. We have but touched the brink of this great sea of knowledge. "The great art of healing is not brief, but hard and long." If what I have said, inadequate though it be to so large a survey, does but stimulate one of our number to strive to add even one little fact to the sum of knowledge, it will not have been said in vain. Of this I feel confident that, if we are faithful to the inductive method and constantly correct the premiss by more precise observation and experiment, being ever ready to relinquish the most cherished theory when the smallest fact renders it untenable, we shall pursue our art with ever-increasing satisfaction to ourselves and advantage to our patients. There are large victories still in store for us to reward our utmost labour—victories which will bring incalculable blessing to the suffering, to whom it is our high vocation to minister. So labouring in the profoundest reverence for truth, we shall be working in the spirit of Him whom we are accustomed to call the Great Physician. (Loud cheers.)

On the motion of Dr. Gardner (Melbourne), seconded by Dr. Morier (Nairne, S.A.), a vote of thanks was passed to the President for his address, and was duly acknowledged.

On the motion of Professor Allen (Melbourne) seconded by Dr. Poulton (Adelaide), a vote of thanks was accorded to the Governor.

LORD JERSEY, in responding, said he was in the happy position of being able to make an announcement which he felt sure would be well received. The Premier had asked him to say that the Government would be very happy to do anything by way of undertaking the printing of the record of the business which took place at the Congress.

Cheers having been given for the Governor, the President declared the meeting adjourned.

RECEPTION AT THE TOWN HALL.

DURING the afternoon, from 3 to 6 o'clock, the members of the Congress and many other guests were received by the Mayor and Mayoress of Sydney (Alderman W. P. and Mrs. Manning), at the Town Hall. The reception was very largely attended, and passed off successfully. Elaborate preparation had been made in the way of decorating the great hall. Palms and ferns effectually relieved the walls, gallery fronts were hidden under a floral network, while column was joined to column by gracefully-looped strings of green foliage. The visitors, having received welcome from the Mayor and Mayoress, grouped themselves about the hall, and passed the time very pleasantly in conversing and in listening to a programme of music rendered on the grand organ by Mr. Wiegand, the city organist.

Tea and other refreshments were admirably served.

Evening Sitting.

THE Congress re-assembled at 8:30 p.m. in the great hall of the University.

The President (Dr. SYDNEY JONES), occupied the Chair.

There was a large attendance of members of Congress.

Professor ANDERSON STUART said he had been somewhat pained at the meeting of the Congress that morning to find himself referred to as "the" secretary, while his colleague, Dr. Knaggs, had not been referred to at all. He entirely wished to disclaim any undue amount of credit for the arrangements of the Congress, a large portion of the secretarial work having been performed by Dr. Knaggs. (Applause.)

Dr. TARRANT moved, "That the question of the nomination of members of the executive committee of the next session of Congress be referred to the following Committee for report: Drs. Verco, Sydney Jones, Balls-Headley, Bright, Milford, Creed, Gibson, Hankins, M'Carthy, and the mover; and that the report of such committee be considered on the last day of the present session or at such other period of the sitting of the session as the President shall determine." He said that in submitting the motion to the meeting he might be permitted to dwell for a short time on the manner in which the first Intercolonial Medical Congress had been brought together. They were all aware that Dr. Poulton, of Adelaide, had originated the idea of having an Intercolonial Medical Congress, and on submitting that idea to the council of the South Australian branch of the Medical Association, it met with their approval, and they at once proceeded to form a Congress. Medical men throughout the colonies were invited to join that Congress, and when a certain number had subscribed their names a meeting was summoned of all the local South Australian members of the Congress, and at that meeting they proceeded to elect the President and executive officers. He need hardly say that the Congress in Adelaide during the Jubilee year was a most successful one, and at its termination provision was made for the election of a president of the second session of the Congress to be held in Melbourne. At that meeting, Dr. Fitzgerald, of Melbourne, was elected president of the second session, and Professor Allen, of the Melbourne University, promised to make the preliminary arrangements in Melbourne to have the Congress carried out. Professor Allen communicated with the medical societies in Melbourne, and they had fallen in with his views and had given him every assistance, and had nominated certain representatives to the provisional executive committee of the Congress. Further meetings were held, and eventually eighty-seven members were appointed to the executive and general committee, representing

the whole of the profession throughout Victoria. That second session of the Congress was also eminently successful, and at the termination of its labours on the last day they held a meeting and elected Dr. McLaurin to be president of the third session of Congress, to be held in Sydney. Nothing appeared to have been done further by Congress itself, but it appeared that some of the Sydney members of the second session met together and decided to appoint the honorary secretaries and honorary treasurers. These gentlemen communicated with the medical societies of New South Wales, and these societies nominated certain representatives to the executive. The members of the profession in New South Wales were also communicated with by the secretaries, and were invited to become members of the Congress. He believed that invitation met with a good response. In sending out these invitations to many members of the profession, they also invited these members to become members of the general committee. The gentlemen nominated by the medical societies met together, and they made further appointments, the members of the general committee never being communicated with. They had in no way been consulted as to whom they would suggest to be placed on the executive committee, and it was quite unnecessary for him to remark to the New South Wales members of the profession that that action had caused considerable dissatisfaction amongst a section of the profession, who considered that the staffs of the principal hospitals and the country practitioners were not fully represented on that executive. At a meeting which was subsequently held of members of Congress in Sydney, which at his (Dr. Tarrant's) suggestion had been called by Dr. Knaggs, a section of the profession protested against the action which had been taken by the executive in existence at that period. He would not touch any further on the matter, and he simply desired to say that his object in introducing that motion was to prevent a recurrence of the matter complained of, when it was decided to hold a session of Congress in some other colony. He had explained that in Adelaide all the local members of Congress had been called together, and at that meeting they had appointed their executive officers. It struck him that they could not adopt a better method than that. He was of opinion that, in a country like this, the subscribing members of Congress should have some voice in the nomination of the executive, and it was with that idea, and principally with the object of preventing a recurrence of the ill-feeling which had sprung up in New South Wales as to the appointment of the members of the executive, that he had submitted the resolution. It was simply a resolution asking that meeting to appoint a committee which would thoroughly discuss the subject, and then report to Congress. (Applause.)

Dr. GOODE seconded the resolution, and said he thought it well that there should be certain rules and regulations laid down for the selection of officers connected with future sessions of Congress.

A prolonged debate followed, during which the motion was supported by Drs. Warren, Woodward, McCarthy, Hodgson, Ellis, McDonagh, and Blackall; and was spoken to by Drs. Balls-Headley, Milford, Verco, Lockhart Gibson, Barrett, Creed, Springthorpe, Hurst, Megginson; also by Professor Allen, who, together with Drs. Verco, Lockhart Gibson, and Springthorpe, suggested the withdrawal of the motion. In the course of the debate Drs. Balls-Headley and Creed requested that their names might be removed from the list of those named in the proposed Committee.

Dr. TARRANT having replied, the motion was put, and a division being called for, was found to be lost by a large majority.

At half-past ten o'clock the meeting was adjourned.

Second Day.—Tuesday, 27th September, 1892.

At 10 o'clock a.m., Professor Allon (Melbourne), President of the Section of Anatomy and Physiology, delivered his presidential address before a large meeting of the members of Congress in the Vesalian Theatre of the University Medical School.

At 11:30 o'clock, Dr. James Robertson (Melbourne), President of the Section of Medicine, delivered his presidential address in the Harveian Theatre to a large audience.

On motion of Dr. Bickle (S.A.), seconded by Dr. Verco (S.A.), a vote of thanks to Dr. Robertson was unanimously accorded, and was suitably acknowledged by him.

At noon, Dr. Walter Balls-Headley (Melbourne), President of the Section of Midwifery, delivered his presidential address in the Hallerian Theatre to a large audience.

The following papers were read in the various sections:—

SECTION OF MEDICINE.

A case of Progressive Muscular Atrophy, with unusual cord lesions. John Gibson.
(Through the kindness of Dr. F. H. Quaife, of Sydney, the microscopic sections illustrating this paper were beautifully shown by means of Wright & Newton's projecting microscope.)

SECTION OF SURGERY.

Death under Anæsthetics. A. Shewen.

Notes on cases of Chronic Abscess treated by Barber's method without drainage.
George Cleghorn.

Two cases of Anchylosis of the lower jaw. Ben. Poulton.

The nature and treatment of Ganglion. G. A. Syne.

SUB-SECTION.—DISEASES OF THE NOSE, THROAT, AND EAR.

Post-nasal growths. James W. Barrett, Percy S. Webster.

Notes on Adenoid Vegetation of the Nasopharynx, with special reference to the form of deafness connected with their presence. John Lockhart Gibson.

On Adenoid Vegetation. W. F. Quaife.

SECTION OF PUBLIC HEALTH.

Notes on Worm-nests occurring in the Cellular Tissues of the Brisket of Cattle. John Gibson.

Notes on the Diseases of Queensland for the years 1887-91, in relation to Atmospheric Conditions. David Hardie.

Registration of Still Births and Protection of Infants. George Lane Mullins.

Diseases of Samoa. Rev. S. H. Davies.

Public Health. Andrew Ross.

Leprosy in Queensland. Joseph Bancroft.

Statement concerning the number and nationality of lepers received at the Lazarets on Daymen and Friday Islands since their establishment. A. E. Salter.

SECTION OF ANATOMY, PHYSIOLOGY, PHARMACOLOGY, AND PATHOLOGY.

Observations on the normal position of the Vermiform Appendix. G. E. Rennie and Cecil Purser.

Recent progress in microscope construction, with demonstration of modern microscopic apparatus. Gustav Lennhoff.

Two cases of Congenital Malformation of the Heart. John Morton.

On the closure of the central canal in the spinal cord of the foetal lamb. J. T. Wilson.

On a series of varieties in human anatomy. J. T. Wilson.

Demonstration of dwarf skeleton by Dr. Poulton (for Professor Watson, of Adelaide), and of another case of dwarf skeleton.

Notes on the functions of the thyroid gland, with observations on a case of thyroid grafting. J. Lockhart Gibson.

The effect of food on the secretion of Bile in Man, with an analysis of human bile. C. J. Martin.

GARDEN PARTY AT GOVERNMENT HOUSE.

IN the afternoon His Excellency the Governor and Lady Jersey received the members of Congress at a Garden Party at Government House. The company numbered some eight or nine hundred ladies and gentlemen. The afternoon was a perfect one for such an entertainment, and was thoroughly enjoyed by the guests.

Third Day.—Wednesday, 28th September, 1892.

At 10 o'clock a.m., Dr. Gardner (Melbourne), President of the Section of Surgery, delivered his presidential address to a large audience in the Hunterian Theatre of the University Medical School.

On the motion of Dr. Sydney Jones a unanimous vote of thanks was, at the conclusion of his address, tendered to Dr. Gardner.

During the forenoon the following papers were read:—

SECTION OF MEDICINE.

Some points in the Etiology, prevention and treatment of Pulmonary Phthisis. James P. Ryan.

Lead-poisoning as observed among children in Brisbane. Visiting Staff and Resident Surgeon, Children's Hospital, Brisbane.

SECTION OF SURGERY.

A case of Rhinoplasty—Exhibit. Alex. MacCormick.

Excision of wall of Pharynx—Exhibit. Alex. MacCormick.

Dislocation of the acromio-clavicular joint. George E. Twynam.

Remarks on the radical cure of Hernia. Fred. D. Bird.

Acute appendicitis, perforation, drainage recovery. John Gibson.

Cases of Intestinal Obstruction—Exhibit. Alex. MacCormick.

Cases of Pylorotomy. Alex. MacCormick.

SUB-SECTION.—DISEASES OF THE NOSE, THROAT, AND EAR.

Nasal disease as a causal factor in affections of adjacent parts and distant organs. C. H. Smith Hozier.

Thyrotomy for Papilloma of the Larynx in young children. Alfred W. Lendon.

Case of Parasitic disease of the throat, with exhibition of patient. James A. Dick.

Hypertrophy of the Lingual Tonsil. T. K. Hamilton.

SUB-SECTION.—DISEASES OF THE EYE.

Notes on the practical use of the direct method for estimating refractive Anomalies. John Lockhart Gibson.

An operation for Pterygium. Thomas Evans.

Cases of Dot Cataract, and cases of Tumour of the Optic Nerve, and case of Paralysis of the third nerve secondary to Polypus of the nostril. T. K. Hamilton.

Cases of Congenital Defects. W. Odillo Maher.

In this sub-section, Professor Anderson Stuart also gave a short demonstration on the hyaloid membrane of the vitreous, and exhibited two specimens showing that this membrane covers the anterior surface of the vitreous.

SECTION OF PUBLIC HEALTH.

Insanity in its Relation to the Law. F. Norton Manning.

Statistics of Insanity in New South Wales in relation to the Census of 1891. Chisholm Ross.

On the plea of Insanity in Criminal Trials. J. W. Springthorpe and W. L. Mullen.

Idiocy and Juvenile Insanity in Victoria. J. V. McCreery.

Clinical Notes on a case of Hydrocephalic Idiocy. John Steell, Kew.

As the outcome of an interesting discussion which ensued on the reading of the papers by Drs. Manning, Springthorpe, and Mullen, Dr. Springthorpe moved—

That, in view of the fact that the present recognised legal test for insanity is false in theory and unsatisfactory in practice, and that legal authorities have expressed a desire to obtain some authoritative expression of medical opinion upon the subject, this Section submits for ratification by the General Congress the following resolutions:—

1. That it is impossible to frame any single test for insanity in criminal cases which is capable of general application.
2. That for criminal cases it would be in accord with present medical opinion to define insanity as a disease of the brain, affecting the intellect, the emotions, and the will, and not immediately induced by default of the individual, leaving the two following questions for the Jury:—(a) Has the accused such disease; (b) Was his act the outcome of such disease?

Dr. JACKSON (Brisbane) seconded the motion.

Amendment moved by Dr. MANNING,—That the resolution be referred to a committee, consisting of Drs. Springthorpe, Mullins, Ross, Sinclair, and the mover, to report to the Congress on its last day of meeting.

Dr. MULLEN (Melbourne) seconded.

Amendment carried.

PICNIC BY THE GOVERNMENT.

In the afternoon the members of the Congress were entertained by the Government at a picnic. Steamers were provided, and at 2 o'clock a large number of ladies and gentlemen left Circular Quay for the Quarantine Station at the Heads. On arrival, the station and its equipments were inspected with interest, and a pleasant afternoon was spent, refreshments being admirably served. The Ministry was represented by Sir George Dibbs, Sir Julian Salomons, Hon. T. M. Slattery, Hon. Henry Copeland, Hon. John See, Hon. W. J. Lyue, Hon. R. E. O'Connor, and Hon. E. Barton.

PRESIDENT'S DINNER.

In the evening Dr. Sydney Jones (President of the Congress) gave a dinner at the Town Hall, and had gathered round his board about 400 guests. On the right hand of the host were seated,—His Excellency Lord Jersey, the Hon. John Lackey (President of the Legislative Council), the Mayor (Mr. W. P. Manning), Dr. James Cox (Sydney), Dr. Verco (Adelaide), Dr. Wolfe (Glasgow), Dr. Poulton (Adelaide), Dr. Bright (Tasmania), Dr. Balls-Headley (Melbourne), Sir Alfred Roberts (Sydney), and Professor Anderson Stuart (Sydney). On the left hand of the host were seated,—Sir George Dibbs (Premier), Sir Wm. Manning, M.L.C., Hon. R. E. O'Connor (Minister of Justice), Captain Chalmers, A.D.C., Mr. H. C. Russell, C.M.G., Professor Liversidge (Sydney), Dr. Thomas Chambers (Sydney), Mr. Cecil W. Darley, C.E., Hon. Dr. Mackellar, M.L.C., Dr. Whittell (Adelaide), Dr. Giblin (Tasmania), and Dr. Knaggs (Sydney).

Among the guests who occupied seats at the lower tables were the vice-presidents of the Congress, and Professor Warren, the Hon. E. Greville, M.L.C., and Mr. H. C. L. Anderson.

"The Queen" having been loyally honoured, the company, on the invitation of the chairman, drank with enthusiasm the health of "His Excellency Lord Jersey."

Lord JERSEY, on rising to respond, was received with prolonged cheering. He said: Mr. President and Gentlemen,—You have applied to me such a dose of “soothing syrup,” and at the same time an exhilarating tonic, that I am quite at a loss to know how to thank you. This sumptuous hospitality of Dr. Sydney Jones, which we have all enjoyed so much, and the hearty reception and recognition you have extended to me, enhance considerably the pleasure which I feel again in meeting in this magnificent Town Hall the men of light and leading in the medical science of Australia. You have said that I have taken interest in this Congress. I think that we all take an interest in the doctors for the best of all reasons, that we do not know where on earth we should be were it not for the doctors. I am glad to know that here in Sydney there has been such a warm welcome extended to our friends from other colonies. It would seem, indeed, that if we are not federated by Parliaments, at any rate we are federated by many objects of common interest. And surely all the great subjects of the day had much better be settled by congresses and conferences than in the somewhat ruder way that used to be done in olden times. Rough edges are smoothed down, and the pursuit of knowledge is very much advanced by the contributions which each one can make of valuable hints and useful suggestions. There is no one to whom I would yield in grateful recognition and grateful thanks to the members of the medical faculty. I owe myself very much indeed to their care and to their attention. There is no one to whom I would yield in admiration for their public services. I think that there are two lessons which we as citizens or politicians can learn from medical men. We know that when a subject is suffering from fever or undue excitement that it is considered desirable at times to reduce the temperature. Well, I think that it is a good thing for leading public men when the body politic is excited to use all their influence in order to reduce that excitement. And again, we know that medical men are always seeking to find the newest improvements, and are glad to welcome any advance in knowledge; but at the same time they recognise that there are certain fundamental laws of nature which must be obeyed. So also may politicians remember that whilst they seek to make fresh improvements in our statute book that there are also certain laws of government which must be upheld. We are very proud of our advancing civilisation; but we must also take care that we do not take a step backward in the civilisation which we have acquired. The law is the gradual embodiment of the people’s wisdom. It has not grown up in a single night or in a single year; but it is the result of the thought of many ages. And, though it is quite necessary that changes should take place in the law, yet that should be done after careful deliberation, and should be based upon the principles of reason and of justice. The defence of the law does not depend upon Governments alone, as some people seem to think; but it is a duty which devolves upon the whole people. For the law exists for the people at large—and no true friend either of liberty or of the people would ever teach otherwise. In bygone ages, when many lands were under the thrall and the whim of tyrant rulers, we saw freedom. After long years of fierce, bitter contests, and after many a sacrifice on the field of battle, or on the scaffold, the law fought its way upward and prevailed. In our own days patriotic men, at great personal sacrifice, are still struggling upon a fairer, but, perhaps, not less arduous, field for the improvement of their fellow citizens. And the triumph of the law over might was equal to the triumph of liberty over tyranny. Here is a heritage which we have acquired. Is that heritage in danger? I cannot—I dare not—believe that our race would in any part of the world ever imperil the conditions upon which personal freedom or national progress

must rest. And, gentlemen, we live in times of excitement, but we are not to be carried away, and to think that, though they are times of excitement, they really are times of danger. When a patient is in a critical condition his medical attendant keeps his head cool, and it is necessary, above all things, that in those times we should keep our heads cool. No people can live entirely within itself, and the preservation of the national credit is one of the axioms of political life. Looking, as I may be entitled to look, not only with an impartial eye—impartial at any rate as regards party politics—but also with a keen desire for the unsullied reputation and the continued prosperity of New South Wales, I may say with confidence that I do not believe that either public men or private persons would ever allow the great fabric of liberty which rests upon the foundations of law and order to be shattered here in Australia. And what is true of New South Wales is true of every part of Australasia, because one blow—one cruel blow—struck in one portion of this great continent would vibrate throughout the whole. An Australian may well make an appeal at a time like this—not an appeal limited to any class or any interest, but a wide appeal to everyone—to the merchant at his desk as well as the worker at his trade, because each one has the same great interest at stake. And it can also make an appeal to the rather selfish and rather careless neutrals who never struggle for a noble cause, and who have never upheld a single right. I should like to ask the men and women of this land of promise to consider in their own homes with unbiassed minds as they ponder over their hopes and their wishes—what is a country without law, and what is liberty without order? The response would, I feel sure, be one which would be reassuring to all the friends of Australia, and would be confounding to all the detractors of Australia wherever they may be. And it might be expressed in some telling words. We could imagine that the answer that would be given would be that we are yet a people, have some sense of duty, something of a faith, some reverence for laws which ourselves have made, some patient force to change them when we will, some civic manhood, and some loyal spirit. I will only now thank you once more for having drunk my health, and once again say how glad I am to have had the opportunity of seeing men who are doing so much to advance science in this country and to preserve us alive.

Sir GEORGE DIBBS proposed “The Intercolonial Medical Congress of Australasia.” He said he must, in the first instance, acknowledge the wisdom of the speech delivered by His Excellency the Governor, which, in the present state of the political world in this Colony, might well be expected to bear good fruit. It was a speech which pointed out the enormous advantages of law and order, and especially of the maintenance of that law which the people had made for themselves. Though present in body in that hall his mind wandered to another part of the city where the battle of law and order was being fought in the interests of Australia as a whole, and hence his remarks must be brief. The toast he had to propose was one which New South Wales rejoiced to honour. The people of New South Wales were delighted to have assembled within the Colony the parliament of the medical intellect of Australia—a parliament of men who were devoting their lives not to the purpose of making money, but to the use of, and the gift to the world of, the great gifts Almighty God has given for the purpose of relieving our common humanity. The present Congress bore evidence to the true love of charity which had place in the hearts of the medical men of Australia. He quite understood that many gentlemen attended the Congress at personal inconvenience, but thought nothing of that in view of the enormous benefit which would accrue from the meeting of Congress.

The toast was received with enthusiasm.

Dr. SYDNEY JONES, on rising to respond, was received with loud and prolonged cheering. He said he valued most highly the honour done him in his election to the post of president of the Congress, and felt proud to have gathered round him that evening so many of his brethren of the profession. In the first place, he wished to tender to the executive Government of this Colony the thanks of Congress for the generous manner in which money had been voted to defray, in a measure, the expenses of the session, and also for the magnificent manner in which the Government had entertained members of Congress that afternoon. He desired to say that, remote as Australia was from the medical world of Europe, yet the meeting of Congress was noted with interest in the old world. So distinguished a man as Professor Terrier, of Paris, had intimated that had he known at an earlier date of the meeting of Congress he would have made an effort to visit Australia and attend the session. They were extremely fortunate in having as a visitor to the Congress Dr. Wolfe, of Glasgow, a gentleman who stood deservedly high in his profession. He thought the presence of so distinguished a surgeon, and the messages received from other eminent medical gentlemen, showed that though Australia was at the end of the world, yet she was making herself heard. He thought that the widespread disposition, so manifest during the last quarter of a century, to hold congresses, councils, and conferences upon scientific, social, political, and religious subjects had arisen from a universal impression that such gatherings must necessarily tend to quicken interest and diffuse a wider knowledge of the subjects which might be discussed. That this has been the case there can be little doubt, and it is certain that the social contact which such gatherings bring about, has done much to smooth down difficulties and remove misunderstandings. In a word, that men have thereby learned to love one another more, because they have come to know one another better. Did our congresses bear no other fruit, the time and money devoted to them would be well spent. He trusted that as a result of this, the third session of the Intercolonial Medical Congress of Australasia, they would be enabled to improve their art in many respects and cultivate the scientific side of their profession in a more enthusiastic manner than in the past.

The Hon. R. E. O'CONNOR proposed "The Visiting Members of Congress." He said he proposed the toast with peculiar pleasure. Medical science was universal in its sympathy, its only limit being the limit of suffering humanity. They must all feel gratified that so many gentlemen had made a point of attending a congress which was for the common benefit of medical science—a science which was for the benefit of the human race. The labours, the discussions, the common knowledge brought together would, he had no doubt, conduce to the general well-being of the community. His Excellency had spoken of the federation of science. He (Mr. O'Connor) thought that congresses for social and scientific purposes were the tendrils these colonies were stretching out one to another, and which must in time form that social network which must be the foundation of political union.

The toast was responded to by Dr. Wolfe (Great Britain), Dr. Balls-Hedley (Victoria), Dr. Verco (South Australia), Dr. Lockhart Gibson (Queensland), Dr. Giblin (Tasmania), Dr. Cleghorn (New Zealand), Dr. Davis (Samoa).

During the evening the City Organist (Mr. Wiegand) rendered selections on the grand organ.

Fourth Day.—Thursday, 29th September, 1892.

At 11 o'clock a.m., Dr. Whittell (Adelaide), President of the Section of Public Health, delivered his presidential address to a large audience, which included His Excellency the Governor and suite.

On the motion of Dr. F. Norton Manning, seconded by Professor Anderson Stuart, a vote of thanks was at the conclusion of his address accorded to Dr. Whittell.

An important discussion, which was attended by His Excellency the Governor, took place in the Section of Surgery, introduced by the reading of various papers on hydatids. A very large number of members attended this discussion, and owing to the general interest felt on this subject, the work of other sections was partly suspended so as to enable members to attend the section of surgery. The discussion will be found printed with the papers on that subject in the section of surgery.

The following papers were read in the various sections during the day:—

SECTION OF MEDICINE.

Notes on two cases of empyema in children, mistaken at their onset for cases of peritonitis. H. H. Fleming.

Diabetes, with a case of recovery from diabetic coma, by the use of oxygen gas. L. W. Bickle.

Is beri-beri endemic in Melbourne. C. W. Molloy.

SECTION OF SURGERY.

An enquiry into the results immediate and remote of tapping hydatid cysts. P. Sydney Jones and R. Scot-Skirving.

Hydatids of the brain, especially with reference to their treatment by operation. J. C. Verco, M.D.

On the treatment of Hydatids by the injection of a solution of hydrarg-perchlor. Philip T. Thane.

The surgical treatment of hydatids, based upon an examination of eighty cases operated on at the Adelaide Hospital during the last four years and a half. E. C. Stirling.

Multiple hydatids and their origin. James Graham.

Hydatids in both lungs and both lobes of the liver. Four operations by incision.

Recovery. This is a sequel to a case reported at the last Session. J. C. Verco.

Treatment of ruptured pulmonary hydatids. Humphrey Marten.

A rare situation for a hydatid cyst. C. F. Eichler.

Dr. James Graham also exhibited a case of successful operation for hydatid of the brain of two years ago.

SECTION OF MIDWIFERY.

A novel method of operating for the cure of large ventral hernia; with notes of a successful case. R. D. Pinnoek.

Palpation obstetrical. Jas. A. Dick.

Some questions affecting obstetric practice. W. Camac Wilkinson.

Note on protracted gestation. G. H. MacSwinney.

Model of a gynecological couch. L. Bickle.

Notes on Trendelenburg's position, with exhibition of Krug's apparatus. Ralph Worrall.

SECTION OF PUBLIC HEALTH.

The course and cause of influenza. J. G. Carstairs.

Some remarks on tubercular phthisis. G. L. L. Lawson.

On poisoning caused by canned provisions. William M. Hamlet.

Owing to the inclemency of the weather, visits which had been arranged to the Hospitals for the Insane at Callan Park and at Gladesville were abandoned.

Dr. F. Norton Manning, President, and Dr. Ashburton Thompson, Chief Medical Inspector of the Board of Health, conducted a party of about thirty over the Leper Hospital at Little Bay. None but medical members of the Congress were present, and selected cases which typified several varieties and stages of leprosy were demonstrated to the visitors by Dr. Ashburton Thompson.

Since its establishment in 1883 up till the beginning of last year thirty-one patients have been admitted, namely:—Natives of New South Wales, nine, of whom one has died; nineteen Chinese, of whom eight have died; one half-caste from the West Indies, who was discharged in 1885, his sores having healed, and there being at that time no law to warrant his forcible detention; one Javanese; and one kanaka—total, thirty-one, of whom nine have died, and one could not be detained. At beginning of the year 1891 thirteen lepers were under detention at the lazaret. During the year seventeen persons were notified to the Board as suspected to have leprosy. On examination seven were found to be ill of some other disease. Ten were found to have leprosy; five of them were natives of New South Wales of European descent, four were Chinese, and one was a kanaka from the island of Tanna. One of the five whites died very soon after his discovery. The number remaining under detention on 31st December, 1891, was twenty-one, one native of New South Wales of English descent and one Chinese having died during the year; eight of them were natives of New South Wales of European descent (six males, two females); eleven were Chinese, one a Javanese, and one a kanaka. The male lepers are lodged in the establishment specially provided for them. On the admission of two female patients during the year it became necessary to provide separate accommodation for them and for their nurses. This has been done by erecting a cottage, which affords a bed-room and a sitting-room for each patient, and which is complete in itself as regards kitchen, laundry, baths, and offices; it is connected with the sewers. The rooms are cheerfully furnished, and provided with books and pictures. Two wardsmen attend on the male patients (many of whom require no nursing, but only supervision), and they are lodged outside the gate of the lazaret. Two nurses have been engaged to attend on the female patients; at present they reside in temporary quarters adjacent to the cottage.

Fifth Day.—Friday, 30th September, 1892.

WORK in the various sections was begun at 10 o'clock a.m., and continued during the forenoon. The following papers were read:—

SECTION OF MEDICINE.

Some points in connection with Small-pox. James Struthers.

Chlorosis. T. F. Fleetwood.

Notes on the occurrence of *Anchylostomum duodenale* in Queensland. J. Lockhart Gibson, J. Jefferis Turner.

Snake-bite in Australia. Recent statistics, and a review of recent observations. L. R. Huxtable.

Dr. Mueller's paper on Snake Poison also was printed and circulated in this section, and the subject gave rise to considerable discussion, which resulted in a resolution being passed unanimously, that Dr. C. J. Martin, Demonstrator of Physiology in the University of Sydney, should be requested to undertake the investigation of the subject of Australian snake poisons and their antidotes; and that the Congress be asked to confirm the resolution.

SECTION OF SURGERY.

On Military Surgery. W. D. C. Williams.
 Subcutaneous wiring of fractured Patella. T. N. Fitzgerald.
 A method of treating fracture of the Patella. George E. Twynam.
 On a successful case of nerve grafting. Fred. D. Bird.
 Case of Neuroma of the Median Nerve, recurring three times after removal, with final amputation at shoulder joint. R. S. Bright.
 On 120 cases of Tracheotomy for Diphtheria. Charles B. Clubbe.
 On intubation of the Larynx. A. Jefferis Turner.
 Tracheotomy. W. H. Crago.
 Exhibit of casts of club foot cases. F. Milford.

SECTION OF MIDWIFERY.

Treatment of the Inflammatory Diseases of the Uterus and appendages. Walter Balls-Headley.
 Ovarian abscesses producing symptoms leading to a diagnosis of early ectopic gestation. George Cleghorn.
 Notes on—
 (a) Ectopic Foetus of the fifth month, removed by Abdominal Section.
 (b) Ectopic Foetus, passed full term, removed by Abdominal Section during a super-added normal pregnancy. Ralph Worrall.
 Fibro-cystic disease of Uterus in process of expulsion; Hysterectomy—Exhibit. Joseph Foreman.
 Some points bearing on Vaginal Hysterectomy. E. T. Thring.

SECTION OF PUBLIC HEALTH.

Sewers and no sewers. Experiences in the Eastern Suburbs of Sydney. F. H. Quaife.
 Method of Pathological teaching in the University of Melbourne. H. B. Allen and T. Cheney.
 Notes on a case of pernicious Anæmia. J. Lockhart Gibson.
 Healed pulmonary consumption. G. E. Rennie.

The following report of the Committee, consisting of Drs. Springthorpe, Mullen, C. Ross, E. Sinclair, and F. N. Manning, appointed at the Wednesday sitting to consider the resolutions proposed by Dr. Springthorpe, (Melbourne), and seconded by Dr. Jackson (Brisbane), was submitted to the section.

Your Committee having carefully considered these resolutions, begs to submit them in an amended form, and to ask that the Section recommend them for adoption by the General Congress.

That, in view of the fact that the present recognised legal test for insanity is false in theory and unsatisfactory in practice, and that legal authorities have expressed a desire to obtain an expression of medical opinion upon the subject, this Section submits for ratification by the General Congress the following resolutions:—

1. That it is impossible to frame any one test for insanity in criminal cases which is capable of general application.
2. That for criminal cases it would be in accord with present medical opinion to define insanity as a disease of the brain affecting the intellect, and also, the emotions and the will, and not immediately induced by the default of the individual, leaving the following questions for the jury:—(a) Had the accused at the time of committing the act, such diseases of the brain? (b) If so, did such disease prevent in relation to the alleged crime:—
 (1.) A knowledge of the nature and quality of the act he was doing?
 (2.) A knowledge that the act he was doing was wrong (illegal)?
 (3.) A free determination of his will?

The Report was unanimously adopted, and it was resolved that the resolutions should be submitted to the general meeting of Congress for ratification.

VISIT TO THE WALKER CONVALESCENT HOSPITAL.

AT the invitation of Messrs. James T. Walker, William Henry Walker, and Ernest O. Smith, trustees under the will of the late Mr. Thomas Walker, a numerous company of members of Congress, with half-a-dozen ladies, paid a visit of inspection in the afternoon to the Thomas Walker Convalescent Hospital, in course of erection at Concord, Parramatta River. On the run up the river a stoppage was made at Gladesville to allow the party, which was composed principally of gentlemen resident in other colonies, to have a walk through the pleasure grounds of the Gladesville Asylum. Concord was reached about 4 o'clock, and for rather over an hour the visitors busied themselves in roaming over the hospital buildings and grounds. The Thomas Walker Convalescent Hospital owes its existence to the generosity of the late Mr. Thomas Walker, who bequeathed by will 30 acres of land at Concord and £100,000 cash to secure its erection. Of the money bequeathed about £75,000 will have been expended in February next, when it is expected that the building will be ready for use. Thanks, however, to the generosity of Miss Walker, daughter of the founder of the hospital, an endowment fund has been provided amply sufficient to meet all working expenses, and so to secure the gratification of a wish that inmates of the hospital shall be treated as welcome guests. The hospital is approached from the river by a water-gate—a brick structure containing waiting and smoking rooms, and is completely surrounded by water at high tide. From the water-gate a main roadway leads to the administrative block, which has a frontage of 130 feet, with a tower as a central feature rising to an altitude of 80 feet, and with an open loggia at the top. The front of the building is treated in a way which makes up an imposing façade. A porch in front of the tower forms the chief entrance. This opens into a spacious vestibule, leading through to the recreation hall, on the right of which are surgeon's room, waiting-room, library, and exercise-room, while on the left are the officers' board-room, matron's office, and the main staircase. The recreation hall is 77 feet by 26 feet, and is richly decorated. At the rear of the recreation hall, but separated from it by an area, is the kitchen, with the necessary offices, stores, &c., grouped round the kitchen courtyard. The men's and women's dining-halls are placed conveniently near to the kitchen. On the ground floor of the men's and women's pavilions, which are situated on the right and the left hand respectively of the administrative block, are four wards and a day-room, together with attendants' offices, and on the first floor are seven wards, including special wards, together with the attendants' offices. Accommodation is provided for thirty patients in each pavilion. The grounds have an effective entrance from the Concord road, and in suitable positions within the grounds are the stables, ambulance sheds, grooms' quarters, wood and coal sheds, fire-engine sheds, &c. The hospital buildings are carried out in the Italian Renaissance style of architecture. The walls are of double-pressed brick, with stone dressings, and the roofs are covered with French tiles. The work of laying out gardens, planting trees, &c., is being pushed on rapidly. Much has been accomplished in this respect, and it is expected that when the hospital is formally opened in the early part of next year the gardens, as well as the buildings, will be worthy admiring attention.

CONVERSAZIONE AT THE GREAT HALL OF THE UNIVERSITY.

In the evening a conversazione, which was given by the members of the Congress, was held in the Great Hall of the University. Elaborate preparations had been made in respect of the gathering, and it proved a great success. The Great Hall was used as a miniature museum, concert hall, and refreshment-room. The grounds were illuminated, and the chemical, physical, engineering, biological, and geological laboratories, as well as the medical school and other departments of the University, were thrown open, and demonstrations given, or experiments conducted, which the visitors found to be exceedingly interesting. Altogether about 2,000 invitations were issued, and of these something like 1,400 cards were presented. The guests were received by the President of the Congress (Dr. P. Sydney Jones), who was supported by Professor Anderson Stuart and Dr. Samuel T. Knaggs (Joint Honorary General Secretaries), and Dr. Chambers (Hon. Treasurer), Dr. Norton Manning (President of the Board of Health), and Dr. J. C. Cox. The hall looked very bright, a particularly pleasing effect being produced by some palms and other plants (sent from the Botanic Gardens), which had been artistically arranged under the direction of Professor Anderson Stuart. For the entertainment of the visitors an excellent programme of music was carried out under the supervision of Signor Hazon. The music embraced organ solos, by M. Wiegand; a chorus, a part song, and a vocal waltz, by the Metropolitan Liedertafel; and a 'cello solo by Signor Podenzana. Light refreshments were served on the dais. Dr. W. Camae Wilkinson had got together an unusually interesting collection of bacteriological exhibits. Perhaps the most interesting exhibit was that which was furnished by Mr. C. J. Pound, who has succeeded in obtaining from cattle affected with Actinomycosis (commonly called cancer) typical cultures of the *Actinomyces fungus*. Some good exhibits were shown by Veterinary-Surgeon Park, of Tasmania, who was the first to prove that the cancer of cattle in Australia was no other disease than Actinomycosis. His microscopic specimens of Actinomycosis (cancer) in cattle showed how variable is the growth and development of the fungus. Mr. McGarvie Smith had an excellent display of pure cultures of the tubercle bacillus. The poison of several varieties of snakes, which has taken the form of crystals, was also shown by Mr. McGarvie Smith. Dr. Wilkinson himself exhibited very good specimens of pure cultures of the tubercle bacilli in every stage of growth, both those of human and fowl tubercle, and pure cultures of almost all the organisms known to be the cause of definite diseases—diphtheria, typhoid fever, erysipelas, mouse septicæmia, hog cholera, fowl cholera, Asiatic cholera, pneumonia (Friedlander), anthrax, and glanders. Dr. Wilkinson showed also a large collection of organisms that occur in the earth, air, and water—among them the specific cause of tetanus (lockjaw), and numerous organisms with colour-producing and fermentative functions. Amongst the other collections of exhibits, which were very numerous, were contributions from the Observatory, the Australian Museum, the Technological Museum, the Department of Agriculture, the Commissioners for Railways, the Government Printer, the Medical School, Dr. Norton Manning, Professor Anderson Stuart, Dr. H. Blaxland (Hospital for the Insane, Callan Park), Professor D. Codrington Selman (Technical Education Department), Mr. T. F. Wiesener, Dr. H. G. A. Wright, Dr. E. Fairfax Ross, Dr. L. Bernstein (Lisimore), Dr. William Chisholm, the Hon. Dr. Mackellar, and Dr. J. Cox.

Sixth Day.—(Final Meeting) Saturday, 1st October, 1892.

At 10 o'clock a.m. a general meeting of Congress was held in the Harveian Theatre of the University Medical School, the President (Dr. P. Sydney Jones) occupying the chair.

Professor T. P. ANDERSON STUART (joint General Secretary) read a telegram from the Otago Branch of the New Zealand Medical Association inviting Congress to hold its next session in New Zealand; and also a letter dated the 26th September, 1892, from the New South Wales Local Option League in which the Congress was welcomed to Sydney. The League recognised the aid rendered by the medical profession in showing the true nature of alcohol, and the many dangers accompanying its use, and greeted the members of the profession as to a large extent allies in the effort to free the colonies from the scourge of drunkenness and its several attendant evils.

The letter was received, and the hon. secretaries of the Congress were requested to send a fitting reply.

The PRESIDENT then stated that the next business was to fix the time and place of the next meeting of Congress.

Dr. LOCKHART GIBSON referred to the telegram of invitation received from the Otago Branch of the New Zealand Medical Association, and added "I would like also to say on behalf of the profession in Queensland that we should be very glad if Congress would pay us a visit. I have had a talk with Dr. Cleghorn of New Zealand about the matter. Both colonies would be very glad to welcome the Congress, but neither will be jealous of the other if members chose to have the Congress in the other place."

In reply to the President Dr. Gibson further said that he should content himself by giving, on behalf of Queensland, an invitation to Congress to hold its next Session there, leaving it to some one else to submit a motion to give effect to that invitation, if, after discussion, it should seem to be to the best interests of the Congress to accept the invitation.

Dr. VERCO said, that in order to bring this matter before Congress he would move that the next meeting be held in Brisbane.

Dr. F. NORTON MANNING seconded the motion.

The PRESIDENT said: There is but one motion before the meeting and I must therefore proceed to put it unless some member from New Zealand is desirous of offering Congress an invitation to meet there. The motion is that the next meeting of Congress be held in Brisbane. The time will be fixed in all probability as heretofore by the joint wisdom of the medical societies of the colony in which we are to meet.

Dr. CLEGHORN (New Zealand): I telegraphed to the editor of our leading paper the other day, and told him that some members of Congress wished to have the next meeting held in New Zealand. A telegram in reply arrived yesterday giving us an invitation from the profession in Otago. I may say that the profession in New Zealand will be very glad to have the Congress held there. Otago is the principal medical centre, and I think we may consider the invitation as coming from New Zealand generally. If the Congress should decide to go to New Zealand they would have a very hearty welcome there.

Dr. MACKELLAR (Sydney): I beg to move as an amendment to Dr. Verco's motion that the next session of Congress be held about three years hence in New Zealand.

Dr. FIASCHI (Sydney) seconded the amendment.

Professor ANDERSON STUART: I have given this matter some consideration, and I am of opinion that we ought not to go to Brisbane next time, for this reason: if we go to Queensland we shall certainly have gone geographically round the compass, but we shall be leaving two oversea centres to come one after the other. We have set the Congress going by visiting the three great continental centres. Then let us go to one of the over-sea places, and afterwards, if considered advisable, return to the continent. There are two over-sea places yet to be visited, Tasmania and New Zealand. To my mind the question is simply which shall it be, Tasmania or New Zealand. We have no invitation as yet from Tasmania, but we have one by cablegram and by personal invitation from New Zealand. Then there is this other consideration, that in Otago there is a University, whereas there is none in Brisbane. The presence of a University means a great deal for the success of our Congress, for it means excellent halls for our meetings, and then there is a museum and a flourishing medical school; in fact, all the elements of success are already there. I, therefore, as far as my vote will go, am strongly in favour of going to New Zealand as opposed to Queensland for the reasons stated.

Dr. SPRINGTHORPE (Melbourne) supported the amendment.

The PRESIDENT then called for a show of hands, which resulted in the carrying of the amendment by thirty-six to seven.

The PRESIDENT then intimated that the next business was the election of the President of the next session of Congress.

Dr. SPRINGTHORPE (Melbourne) asked whether it would be in order to move that the President for the time being of the New Zealand Medical Association which sent the invitation should be elected President of the next Congress, or whether it would be necessary to specify the President by name.

A member suggested that since the Congress had accepted the invitation of New Zealand it would be a graceful thing to allow the New Zealand practitioners to nominate the President.

Dr. SPRINGTHORPE pointed out at the first meeting it had been laid down that only Congress could elect its own President. The question was, can we elect a President without naming him? If so, he (Dr. Springthorpe) thought his suggestion would meet both views, for the President would be elected by the Congress, and also by the members of the profession in the Colony where the session is to be held.

Professor STUART: I should like to say a word against that. We are invited by the Otago branch, which is only one of the branches of the Medical Association in New Zealand. Why should we elect the head of a branch of that Association to be President of Congress?

Dr. SPRINGTHORPE: I meant the President of the New Zealand Medical Association, not of any branch of that Association.

Dr. CLEGHORN (New Zealand): The invitation came from the Otago branch of that Association, simply because there was no time to get answers from all the other branches. Had there been a little more time the invitation, I am sure, would have come from the whole of New Zealand.

Dr. VERCO: Is the Medical Society of New Zealand co-extensive with the profession in New Zealand, because otherwise we might be putting into the hands of the New Zealand Medical Association what ought to be done by the whole of the Congress? It seems to me to be rather a risky action on our part to decide that the President three years hence of the New Zealand Medical Association shall be the President of the Congress. We have not the slightest idea who he may be, and he may be elected without the slightest idea of being the head of this Congress.

Dr. CLEGHORN: The President of the Otago branch of the Medical Association of New Zealand is practically the head of the profession in that colony. We have four large centres, each holding monthly meetings, and we have great influence with Government. The President of the central branch of the Association must be a good man. Last session we nearly got a Bill passed through Parliament. We have a journal published quarterly, which represents our views, and, judging from that alone, a good proportion of the profession must belong to the Association. We have a general meeting once a year of the whole Medical Association in one of the big centres. We go from one to the other year after year. There is no other Medical Association in New Zealand.

Dr. HUXTABLE: Notwithstanding what has fallen from the last speaker, there seems to be a stronger objection than has yet been stated against what has been proposed by Dr. Springthorpe, for who is to look after the interest of Congress if the President be not elected? Who is to stimulate men to work in the interests of the coming Congress? Therefore, I think it advisable that we should agree on some one to fill the position at once.

Professor STUART: I beg to move, "That Dr. Batchelor, of New Zealand, be appointed the next President of Congress." He has been an active participator in its business—a man who is recognised, I believe, to be an extremely able man, and altogether a man worthy to fill the position.

Dr. SCOT-SKIRVING seconded the resolution.

Dr. VERCO: I will support that.

The PRESIDENT: I think it is much better to adhere to our original practice and name the individual who is to be the future President. There is always the difficulty that the gentleman nominated now may not be in existence or may be out of the Colony when the Congress meets, as in the present case, Dr. MacLanrin was elected President of this session, but he was compelled to leave the Colony, and the executive committee did me the honour to nominate me. I think that a certain amount of freedom must be left to the executive committee. As has been well pointed out by Dr. Huxtable, there must be some responsible person from the onset to superintend and direct the proceedings, and if we do not name the individual I do not see upon whom the responsibility is to rest. If the matter is left in my hands I should say elect an individual. Do you, Dr. Springthorpe, withdraw your proposal?

Dr. SPRINGTHORPE: I made a suggestion, not a motion. Dr. Huxtable's objection would be met by nominating the secretary and leaving the direction in his hands. However, as it is the privilege of Congress to elect its President, and as Dr. Batchelor is one of the leading men in New Zealand, I, for one, would be most pleased to vote for him.

The resolution that Dr. Batchelor be the President of the next session of Congress was then put and carried unanimously.

The PEESIDENT: I feel quite sure that no better representative of the profession could be elected than Dr. Batchelor, who holds a very prominent position in New Zealand, and who, I am quite sure, will fill the duties of the chair with credit to himself and honor to the colony. The next business is a motion by Dr. Struthers on vaccination.

RESOLUTIONS RE SMALL-POX.

Dr. STRUTHERS (Rylstone, N.S.W.): The resolutions I have to move are as follows:—

- “1. That this Congress is of opinion that there is a real and yearly growing possibility of the introduction of small-pox into Australia; and, in spite of the admirable precautions adopted by the various Boards of Health, there is a danger of its becoming epidemic; and that, owing to the large number of unvaccinated persons in Australia an epidemic of small-pox would be attended with very great loss of life.
- “2. That this Congress desires emphatically to express its belief that efficiently performed vaccination is a valuable protection from small-pox; that when it does not prevent an attack, vaccination deprives the disease of most of its horrors in the great majority of instances; that there need be no apprehension that vaccination, when performed under proper precautions, will injure health or communicate disease; that vaccination should not be deferred until the actual appearance of small-pox.”

As I am a comparatively junior member of the medical profession, I think it is a very great responsibility for me to undertake to move such very important resolutions as these. I could not have attempted to do so but for the circumstance that I have made a special study of small-pox for some time—ever since I was medical officer to two small-pox hospitals in London, where I was deeply impressed with the power of small-pox, and had very strong ocular demonstration of the value of vaccination. I wish to say that these motions have nothing to do with the question of compulsory vaccination. We cannot afford to stand or fall by compulsory vaccination. Vaccination is a far more important question than compulsory vaccination. Why is there such a prejudice against vaccination? For several reasons. In the first place, because they very seldom see small-pox, and consequently they do not fear it. And also for this reason: Apart from the real injury that might rarely result in very delicate children, take any 1,000 healthy children and watch them a fortnight, and you will find many cases of ordinary illness, like bronchitis. Now, vaccination does not prevent these diseases; therefore, among every 1,000 children vaccinated you will find many cases of illness occurring within a fortnight of the process. In each individual case it would appear to the friends as if the vaccination caused the merely coincident illness; and, likewise, there must, now and then be a coincident death; but a nation should not suffer because a few people are unfortunate. A short stay in a small-pox hospital would quickly show any doubting parent the utter hollowness of the entire mass of anti-vaccination statistics and arguments. Only there could one judge truly whether to subject a child to a scratch and a few days' febrile disturbance was not better than to have it in danger of being killed or mutilated by the most hideous of diseases. I hardly think that medical men are fully alive to their duty in view of the gravity of the situation. This is an opportunity

not to be neglected of repeating numerous authoritative warnings of skilled and earnest men that there is a serious danger of small-pox reappearing in Australia. A dispassionate study of the natural history of the disease gives one the conviction that small-pox will again become an epidemic in this country, where years ago it committed great havoc among the aborigines, whom it decimated, thus dispelling the idea that there is some peculiar virtue in the climate which will always keep small-pox down in Australia. I would urge the importance of taking special precautions to guard against this terrible disease. We guard against the introduction of other diseases, and it is only fair, therefore, that similar precautions should be taken against this. There is an extreme likelihood that the disease may be imported by the London boats, and we must not forget that the danger from that quarter is greater now than ever before. Statistics show that in every five years in London there are two years in which the number of deaths from small-pox exceed 5,000. For the first time six years have now elapsed without this number of deaths in London from small-pox. There has, therefore, accumulated a large material for small-pox to feed upon, and the next epidemic in London will be a very serious one, and therefore it is very probable that it will be introduced here. We all know that small-pox has good and bad years, and that after long intervals epidemics occur. There was a serious epidemic in London in 1838-40, and there was another, the last recorded, in 1870-72, which travelled over Europe, North and South America, and parts of Asia; and though vaccination has stamped out continuous small-pox in well-vaccinated countries, in those countries named, small-pox breaks through the mitigating bank raised by vaccination. What then will an epidemic be in Australia, where there is little or no vaccination. If we think of the increased communication between Australia and the old country, such an event as the breaking out of an epidemic here seems extremely likely. I suppose those of you who have travelled in large steamers will have noticed the custom of putting large luggage not likely to be wanted on the voyage in the hold. Infection by small-pox is frequently brought about by means of the clothes carried in this way. The disease is quiescent during the voyage because the clothes are not unpacked, but when the destination is reached and the trunks are taken out, the disease may spread all over the country, and appear in strange places, puzzling people by the mysteriousness of the outbreak. Suppose the disease is brought to Sydney in this way, a person goes into the country, far away, and although healthy himself he carries the epidemic with him, and it breaks out in a place where proper precautions cannot be enforced to keep the disease in check. If then in favourable years it is impossible to keep small-pox in check in a well vaccinated country like England, how will it be here where the proportion of unvaccinated people is so large? This great Australian continent will very likely, in fact undoubtedly, unless a change takes place, present a scene never witnessed since the introduction of vaccination. In no civilised country has there ever been so vast a proportion of the population unvaccinated as here. Judging from the proportion of unvaccinated people in Sydney, and taking the average mortality of young children into account, it is probable that 81,000 would be the proportion of deaths that would occur in Sydney alone if a small-pox epidemic broke out. Commerce would cease, and traffic be suspended. Hamburg was less severely dealt with by cholera than Sydney would be by small-pox, and the country, as experience shows, would, although the population is scattered, suffer almost as much. All this might be falsified if a widespread vaccination movement grew up. I think the medical

profession will have something to answer for, if they do not take steps to prevent an outbreak occurring. It is our duty to do all in our power to warn the public of the danger, and point out the remedy, otherwise when the disease breaks out, parents who have lost their children will turn round and say, "You tell us our children might still be with us had they been vaccinated. Why did you not strive more earnestly to make us believe in vaccination before the epidemic came?" Formerly in remote, barbarous, and of course unvaccinated communities, where small-pox appeared only at long intervals awful ravages were committed. Take Ceara in Brazil, for instance, where in one epidemic 40,000 out of 70,000 were killed by small-pox. But now for the first time since Jenner's immortal discovery, a country in forefront of civilisation is likely to be the scene of similar horrors. It is our duty to earnestly endeavour to avert these. If we fail, small-pox will come, and then assuredly people could learn from the difference in its treatment of the vaccinated and unvaccinated, who was in the right. Terrible is the recklessness of the anti-vaccinator, and he should know what he is doing. Compulsory vaccination might or might not come. But whether it comes or not, that does not affect our duty which is to teach those who are ignorant of the facts. It is not to be an alarmist to point out the danger, and to show the proper defence. I shall trust to my seconder to support the resolutions more fully. Everything controversial has been carefully excluded from them in order that we may present a united front towards the public, and persuade them to adopt a remedy which is attended only with febrile symptoms, and which is the only one that can save Australia from the ravages of a disease which was described by Macauley as in the last century being "Constantly with us, filling the churchyard with corpses, turning the babe into a changeling at which its mother shuddered, and making the eyes and cheeks of the betrothed maiden objects of horror to her lover."

HON. DR. MACKELLAR (Sydney): When I was asked two days ago to second this motion, it seemed to me that nothing more would be required of me than to formally do so, as the resolutions are of such a temperate character, and the statements contained in them are so obviously true. But, on second thoughts, as I intended to speak about the question of small-pox in New South Wales, it seemed to me that I should say a word or two in support of the resolution, because it is extremely likely that my remarks may be criticised by a few clamorous objectors outside, who know nothing of the subject, but who, by continual iteration that small-pox is not prevented by vaccination, and that it will introduce a variety of loathsome diseases, may succeed in preventing numbers who would otherwise be vaccinated from undergoing the operation. Knowing these statements to be false, it seemed proper that I should quote from the official records of the department bearing on the question. It may be within the knowledge of most members of Congress that we have no vaccination laws in New South Wales. According to the document which was placed in the hands of the Government by its Medical Officer, Dr. Norton Manning, President of the Board of Health, in March, last year, there were during the last thirty-one years 786,559 children born in the Colony, of whom only 249,337 had been vaccinated by the public vaccinators. That is about 32 per cent. In the same report he also remarks that of those who were born in the year 1891, not more than 4 per cent. were vaccinated by the public vaccinators. So that we have a very fertile field for small-pox here. Though, for the most part, the neglect of vaccination, this extreme apathy evinced by the people may be due to the agitation of those gentlemen referred to, it is not entirely due

to that, but, perhaps, in part, to the extraordinary idea mentioned by Dr. Struthers, that the balmy climate of Australia would not allow small-pox to spread. It would not be difficult to prove by official records that our atmosphere will afford us no immunity. The mortality which has attended small-pox, when it reached our shores, has been something appalling. In the year 1881 we had an outbreak of small-pox in this Colony. Of the total 154 cases of small-pox, forty died, being an average of 25.19 per cent.; ten of those had been vaccinated in early life, twenty-nine had never been vaccinated, and of one there was no record. Thus, of the total number of deaths in which vaccination or non-vaccination had been recorded, 25 per cent. occurred amongst vaccinated persons, and 72.5 per cent. amongst unvaccinated persons. This is a very remarkable fact, and certainly does not bear out the idea commonly entertained that our climate is so salubrious. Of the total 154 cases the disease was contracted in forty-two instances from an intimate of the same house, and in many instances the disease was caught owing to the father having refused to allow his children to be vaccinated. In one unvaccinated family at Pymont consisting of ten members, all caught the disease, and two died; two were vaccinated the day after the house was struck. In another family of eight persons at Woolloomooloo Bay, six unvaccinated persons died of the disease. These statements are of so startling a character that they ought to be proved to be untrue, or the anti-vaccinators should acknowledge their error. But I will not weary you with any more statistics further than those contained in the report presented by the Board of Health after an investigation made by Dr. Ashburton Thompson on March 5th, 1887. That was on account of a small-pox ship, the "*Preussen*" which arrived here in December, 1886. The official report stated that of the passengers detained at the quarantine station nineteen had never been vaccinated. Of these, fifteen took small-pox, nine of whom died, and one lost her eyesight. There were fifty-five passengers who were said to have been vaccinated and revaccinated. Of these, four were attacked, but none died. I take it that it is no part of the duty of this Congress to frame vaccination laws, or even to advise the Governments as to their enactments but there is a much broader duty than that to the public—the duty as set forth by Professor Gardner, of Glasgow, who said, "Where we cannot legislate, we can still teach; where we cannot command, we can still warn; and neither the existence nor the absence of arbitrary power, neither the expediency nor the inexpediency of interference by the authorities, can exempt us from the duty of knowing what is amiss and diffusing that knowledge far and wide." And, therefore, having these sentiments, I very heartily second the motion which was moved by Dr. Struthers, for I feel that those who have the matters in hand in this Colony, and, I think, in Queensland, have a most awful responsibility, in that, as Dr. Struthers has pointed out, when the next great small-pox epidemic does break out in London it is quite possible—it is more than that, it is quite likely—that we shall have a corresponding epidemic, which will cause general dismay.

DR. CAMAC WILKINSON (Sydney) : I have only just come into the room, and I have not had the opportunity of hearing the remarks of Dr. Struthers, but I have always been a very strenuous advocate of compulsory vaccination. I may say that the only time I was one of the representatives in the Legislative Assembly I tabled a motion for the purpose of bringing this matter before the public, rather with a view of exciting criticism than with any hope of carrying the motion. I felt at the time that in talking to laymen, who knew very little about it, the subject was one which really required a great deal of advocacy on the part of those best qualified to express an

opinion, and therefore I take this opportunity of strongly supporting this motion in the hope of putting the people in the way that appears to be in accord with the scientific teachings. I think it may be said that under the present circumstances Australia is fortunately situated. We are protected, no doubt, by quarantine regulations, but we have been protected very much more by our geographical situation. But, with increasing population, these advantages will, of course, gradually diminish, and as they diminish we should aim at establishing some other system, based on the experience of largely populated countries, that will help to protect us absolutely from this scourge. The motion tabled by Dr. Struthers is one of which I heartily approve.

The PRESIDENT: I think the resolution moved by Dr. Struthers cannot fail to have an influence for good on the public mind. At any rate, we shall have discharged our duty in calling attention to what we consider to be a very grievous evil, and terrible danger; and the very moderation of the resolution must commend itself, not only to the profession, but to every member of the public.

The resolutions were then put, and carried unanimously.

PROPOSED NEW TEST FOR INSANITY.

Dr. NORTON MANNING (Sydney): The resolutions I have to submit are as follows:—That, in view of the fact that the present recognised legal test for insanity is false in theory and unsatisfactory in practice, and that legal authorities have expressed a desire to obtain an expression of medical opinion upon the subject, the Congress approves of the following resolutions:—2. That it is impossible to frame any one test for insanity in criminal cases, which is capable of general application. 2. That for criminal cases it would be in accord with present medical opinion to define insanity as a disease of the brain, affecting the intellect and also the emotions and will, and not immediately induced by the default of the individual, leaving the following questions for the jury:—(a) Had the accused, at the time of committing the act, such disease of the brain? (b) If so, did such disease prevent, in relation to the alleged crime (1) a knowledge of the nature and quality of the act he was doing (2) a knowledge that the act was wrong—illegal, (3) a free determination of his will?" These resolutions were formulated in the first instance by members of the Congress in Victoria. They have since been considerably modified by a committee of five members appointed by the Section of Public Health; they have been approved by that section, and they are now submitted for ratification by Congress. There can be no doubt that the present legal test for insanity is false in theory and unsatisfactory in practice, and that something new is required. These resolutions have in substance been adopted in Germany and France and in America, and they are in accordance with the views of distinguished alienists like Griesinger and Maudesley, and individual judges, both in England and in this Colony, had directed juries in accordance with the views set forth in them. They present, therefore, no great innovation. It would have been possible to present something very much more scientifically accurate, but in view of the conservative weaknesses and prejudices of our legal brethren, it has been deemed advisable to retain even the wording of the legal tests as at present set forth by jurists, and to make thereto such additions as will bring the test in line with the improved psychological knowledge of our time. These

additions were:—(1) To lay down a physical basis for insanity and its recognition as due to disease of the brain; and (2) to point out that in many cases this disease affected the emotions and the will as well as the intellect. At present, as you are aware, this test is entirely applied to the intellectual faculties, and consists of the question: Did the accused know right from wrong, and was he cognisant of the nature of his act? So that, no matter how painful and how pressing the delusions under which the accused suffered, no matter how vivid and insistent were his hallucinations of sight or hearing, even though these delusions or hallucinations had a direct reference to and bearing on the crime committed, if he knew right from wrong—and in most cases he did so—he was, in the eye of the law as at present administered, guilty of and responsible for the act. Again, though a woman in the post-*puerperal* condition, filled with melancholy and dread, fearful of the future of her offspring, is impelled to kill it, and though she might have beforehand begged for protection against herself, she was deemed guilty and responsible if she knew right from wrong, which as a rule she undoubtedly did. We ask for some further recognition of insanity with delusion, of insanity with impulse, and also of insanity with congenitally defective will-power, as diseases. These are the three chief classes of insanity, in which there is now friction between the medical and legal views of responsibility. I said insanity with impulse advisedly, but I avoided the words uncontrollable or irresistible impulse. I am no advocate for making impulse alone a plea for irresponsibility. It is true that cases of the kind I have indicated are not often hanged, the jury being more merciful than the law as interpreted by the judges, or the Executive occasionally steps in and prevents a scandal and a wrong; but these means do not tend to increase the respect of the general body of the people for the law, or to give them confidence in its processes. I now submit the resolutions, which have been very carefully prepared for your acceptance.

Dr. SPRINGTHORPE: These resolutions have been carefully considered by a Committee appointed by the Health Section, unanimously agreed to by that Committee, and passed by the whole section itself. It is therefore unnecessary for me to say anything more, particularly after the critical speech made by Dr. Manning. I will only add that, as a visitor from another Colony, I must express my extreme thanks for the courtesy and valuable assistance we have received in this matter from Dr. Manning and the other members of the Committee. We settled a difficult question, without any friction on a fair and reasonable basis, which commends itself not only to the medical profession, but, as is very evident, to the legal profession as well, and I venture to think that when they look into these resolutions, and carefully consider them, they will accept the conclusions embodied therein.

The PRESIDENT: You have heard the resolutions moved by Dr. Manning and I am quite sure all of us are willing to accept the verdict of the Public Health Section, and do not care to intrude our own individual opinions, even should they be adverse to that of the section. They have most carefully considered the matter, and being experts their opinion must be of the greatest weight.

The resolutions were then put, and carried unanimously.

POST-NASAL GROWTHS AND EAR DISEASE.

The PRESIDENT: The next business is the moving, by Dr. Lockhart Gibson, of certain resolutions unanimously adopted by the sub-section on diseases of the nose, throat, and ear.

The Joint General Secretary (Professor Anderson Stuart) read the resolutions, as follows, and moved that they be received:—1. That the form of nasal obstruction produced by post-nasal growths is very prevalent in the Australian Colonies. 2. That it is the chief cause of ear disease, and produces other physical disturbances. 3. That the widest publicity should be given to the fact that habitual mouth-breathers are in a serious condition. 4. That with early recognition and appropriate treatment the number of cases of deafness and deformity, with arrest of development, will be greatly reduced.

Dr. LOCKHART GIBSON (Brisbane): The subsection on diseases of the throat, nose, and ear, were unanimously of opinion that it was of extreme importance to the public health generally that these resolutions should receive the support of Congress, and I have accordingly been asked to move a resolution to that effect. Those who have done any work in connection with ear, throat, and nose, are aware how important it is that these post-nasal growths should be treated at as early a stage as possible. These growths frequently occur in very early life, when they arrest the development, and to remove them, therefore, so as to allow the child to develop healthily and well is a very important matter. I move that Congress adopt the resolutions as read.

Dr. CAMAC WILKINSON (Sydney): In the absence of my colleague (Dr. Brady), I will second the resolution moved by the last speaker. In my experience of the Sydney Hospital, now extending over five or six years in the throat and ear Department, I can vouch for the truth of every word he has said. And not only from my own experience, but also from the experience of the men who called attention to this matter. The British Medical Association, within the last two or three years, emphasised the fact that these conditions were not properly recognised by the profession in general—and it is for the purpose of emphasising the importance of this matter that the specialists, who, of course know most about it, wish to bring it before the profession in general, so that it may be continually before them in their private practice. I can say most emphatically that this obstruction produced by post-nasal growths will be very frequently found, not only in children, but in young adults, and that serious harm, especially to the hearing, is done by it. I therefore think it right that the Congress should not only receive this resolution formally, but adopt it with something more than formality. I therefore beg to second Dr. Gibson's motion.

The PRESIDENT: It has been moved by Dr. Gibson, and seconded by Dr. Wilkinson, "That these resolutions from the subsection of diseases of the nose, throat, and ear, be approved by Congress." I may say in support of it, that with very considerable experience, not as a specialist, but as a general physician, I can affirm that we have here a disease of very grave importance, and one of rapidly increasing frequency, being much more commonly met with now than it was ten or twelve years ago.

The resolution was then put, and carried unanimously.

AN AUSTRALASIAN MEDICAL JOURNAL.

The PRESIDENT: The next business is a resolution "That it is desirable to found an Australasian Medical Journal."

Dr. BICKLE (S.A.): In moving this resolution I may say that I have spoken to a good many members in the hope that a provisional Committee might have been formed during the week to consider the matter; but that has not been done, and we have so little time in front of us now that I hardly think it would be advisable to appoint one, but rather to affirm a principle that it would be desirable to establish a gazette or journal to represent the whole of the Australian medical thought. There are many reasons why such a journal should be established, if only for the purpose of assisting in preventing disease. We have already had three Congresses, showing that there is a large fund of medical thought awaiting an outlet. Such a journal would be regarded as the organ of the profession, contributed to by the leading members in all the different professions, and would be regarded as authoritative at home. With one leading editor, and sub-editors in the different colonies, I think such a paper could be well carried out.

Professor STUART: I will second that formally, if necessary.

Dr. MEGGINSON (Sydney): I understand this is merely affirming a principle.

Dr. LOCKHART GIBSON (Brisbane): Yes; it is desirable that an inter-colonial medical journal be established.

The resolution was then put, and carried unanimously.

ELECTION OF A PATRON.

Professor STUART, having pointed out the obligation under which the Congress was to this and other Universities, moved, "That the Chancellor of the Sydney University be elected a Patron of this Congress."

Dr. GOODE (Sydney) seconded the motion; but suggested that at future Congresses there should be no Patrons elected.

The resolution was put, and carried unanimously.

VOTES OF THANKS.

Dr. DAVIES (Samoa) moved, "That the best thanks of this Congress be given to the following:—(1) His Excellency the Governor; (2) to the Government; (3) to the President; (4) to the General Secretaries; (5) to the Treasurer; (6) to the Chairmen and Secretaries of the various sections; (7) to the Chancellor and Senate of the University; (8) to the Sydney Orchestral Society, the Walker Trustees, and the Metropolitan Liedertafel, and last, but not least, to the Press, for the reports which have appeared in the various papers."

Dr. VERCO seconded the resolution.

The PRESIDENT: I thank the mover for including me in his resolution. My thanks are also due to the members generally for the very great forbearance which they have exercised for all my shortcomings during this session of Congress. No one is more conscious of my defects than myself, and having been appointed to fill a vacancy I the more feel the great obligation under which I am to you for your great kindness and forbearance.

The motion was put, and carried unanimously.

STRYCHNINE AND SNAKE POISON.

The Joint General Secretary, Professor STUART, read a resolution from the Medical Section, requesting Dr. Martin, of Sydney, to make some experiments with a view of testing whether strychnine is an antidote for snake poison.

On the motion of Professor Stuart, seconded by Dr. Verco, the resolution was carried.

ADJOURNMENT.

The PRESIDENT then declared the Congress adjourned *sine die*.

HARBOUR EXCURSION TO FERN BAY.

In the afternoon the Congress gave a picnic to Fern Bay. Some 600 ladies and gentlemen, members of Congress, their friends, and other guests, were conveyed by several steamers, leaving at noon. A pleasant trip to Fern Bay was enjoyed, and an excellent and well served repast partaken of in the capacious pavilion there. After lunch various parties were taken by steamer to different points of the Parramatta River, many landing at Gladesville and being hospitably entertained by Dr. Sinclair, Medical Superintendent of the Hospital for Insane there. All returned to town before dusk, after an exceedingly pleasant outing.

SECTION OF MEDICINE.

Presidential Address

BY JAMES ROBERTSON, M.A., M.D.,
Consulting Physician, Melbourne Hospital.

IN occupying this chair, permit me, in the first place, to acknowledge the high honour done me by the Executive Committee of the Intercolonial Medical Congress in electing me to the position of President of the Section of Medicine; and, in the second place, to bespeak your generous sympathy and kind consideration in my endeavour to fulfil the duties devolving on me. The choice of a subject for my address has proved rather embarrassing. It occurred to me that a resumé of the progress of medicine since last meeting of Congress would afford appropriate matter for an address. But, as pathology, at first included in the section of medicine, was afterwards allotted in another section, I felt that medicine would indeed be crippled without the support rendered by pathology, its essential ally, and sure guide, from which it cannot be legitimately divorced. The most recent and important advances in medicine have originated from the study of bacteriology. By its revelations the natural history of infective diseases has been elucidated, and their pathology, embracing ætiology, diagnosis, general course, and termination, has been unfolded. The hope is now excited, that the treatment of all contagious diseases by active or prophylactic measures may be ultimately discovered.

On ruminating over the subjects that have occupied most attention in the medical periodicals I found that discussions on the administration of chloroform, on Koch's treatment of tuberculosis, and on the spread of influenza had been the stirring events of the period.

The existence of Koch's treatment has been transitory; its extinction is only delayed by the effete efforts of the credulous. It was prematurely introduced into practice with great confidence in its efficacy, was at once extensively adopted, and used in the various stages of tuberculosis by many with doubtful success, and by some with eminently successful results, if reports may be credited.

It was claimed for this agent that it was prophylactic, diagnostic, and therapeutic. It has failed to fulfil the high hopes and expectations entertained, and is now apparently passing into oblivion. Influenza has always been a mysterious visitor at more or less prolonged intervals, its origin and source being veiled in obscurity. Generally, it originates in the northern regions, breaks out suddenly, spreads rapidly, extending westwards, and soon becomes epidemic, and even pandemic, affecting all nations and races, apparently independently of heat, or cold, or climate, or any meteorological condition. It certainly differs from all other acute specific fevers in assuming a pandemic character. It is, however, very variable in

its progress, sometimes slow, sometimes very rapid, attacking many countries almost simultaneously. Observations made during the latest epidemic have tended to strengthen the opinion that it is a specific contagious disease, and that it is communicated directly from the sick to the healthy. The disease runs its course speedily in healthy subjects to a favourable termination. It is dangerous to the young, and aged, from the general prostration that accompanies it, and from the liability to the supervention of bronchitis, or bronchopneumonia, more especially in the case of those having a tendency to lung affections. It is said to still linger in the Colonies, but the so-called sporadic cases, now occurring, may be due to febrile catarrh, so prevalent in the winter months, or at the change of seasons. Cholera appears to be following in the wake of influenza, as it has done on some former occasions, but it is more particularly confined to the lines of human inter-communication. Its extension is not so rapid as that of influenza; the medium of its transmission is terrestrial, while that of influenza is rather aerial. Cholera is more a filth disease. It attacks insanitary places, finds its *nidus* in filth, and is especially liable to be propagated through the medium of polluted water.

I am now about to introduce to your notice the special subject of my address, a subject with which you are all familiar, and on which doubtless many of you have already formed decided opinions—"The Administration of Chloroform and its Dangers." In doing so I feel that I owe some apology.

The vital importance of the subject, the frequent occurrence of fatalities, and the conclusions arrived at by the Hyderabad Chloroform Commission, which I regard as fraught with danger, if acted on, have induced me to select this subject. The administration of chloroform, the most potent and valuable of anæsthetics, is to be regarded as one of the most responsible duties devolving on a medical man, seeing that the life of a human being is at stake, and its sudden termination is dependent in a great measure on his care and vigilant circumspection.

Since the introduction of chloroform into practice in 1847, our advanced knowledge of medicine has not contributed to greater safety in its administration, and it cannot be regarded otherwise than as an *opprobrium medicinæ*, that deaths from the exhibition of that anæsthetic have not diminished, but have of late years rather increased in frequency.

We are by no means agreed in regard to experiments, and the lessons they convey, as to the lethal effects of chloroform inhalation; indeed, the dangers liable to result from the careless exhibition of chloroform have been seriously urged as reasons for abandoning its use altogether, and substituting ether, or some other anæsthetic.

In estimating the dangers of chloroform, it should not be forgotten that, in the pre-anæsthetic period, sudden deaths on the operating table were not unknown. Some patients were found to succumb on the first incision through the skin, some on sawing through the bone. Fear or fright, and also pain and shock were adduced as the causes, the more immediate cause being syncope; and even now, some are reported to have died from fear while beginning to inhale chloroform. Doubtless lives are now saved by the use of chloroform, which would have been otherwise lost, and possibly the deaths prevented are quite as numerous as those attributed to its effects. The mission and effort of the physician is to alleviate suffering and prolong life by every means in his power; consequently the use of chloroform should not be withheld in severe and painful operations, especially if tedious or long-continued, involving the brain or abdominal organs, but the utmost precaution should be taken to guard against the dangers liable to supervene. Professor Simpson regarded its administration as unattended with danger.

Professor Syme stated that, "used with moderate care, it is perfectly safe." Dr. Snow was of opinion that "chloroform may be given with safety and advantage in every case, if in a condition to undergo a surgical operation." Dr. Anstie concurred with Dr. Snow's opinion. Surgeon-Major Lawrie concludes "that chloroform may be given in any case requiring an operation with perfect ease and absolute safety, so as to do good without the risk of evil." I might quote other opinions alike favourable, and might refer to statistics equally so; but as I find statistics to differ very widely, I will not trouble you with an array of figures.

Notwithstanding the numerous attestations in favour of chloroform, many, in doubt and distrust, are adopting the use of ether. No anæsthetic can be said to be absolutely free from danger, but with judicious care and caution, the risk may be reduced to a *minimum*. Chloroform has been well described by Dr. Lauder Brunton as being "like a sharp knife in the hands of the surgeon, as compared with a blunt one. It is more efficient for good, if properly handled; it is more powerful for evil, if misused." Ether, it must be allowed, is less dangerous than chloroform, in not causing so much depression of the heart's action, but it is unpleasant, irritating to the air-passages, cannot be used under certain circumstances or in every case; besides, it requires special apparatus for its administration. Chloroform maintains supremacy as the most "pleasant, speedy, and efficient" anæsthetic, requiring no special apparatus, suitable in every case fit for operation, and safe when given with judicious care. Its advantages are such that it has been generally adopted in preference to all other anæsthetics, and is still regarded with most favour. In 1888, and again in 1889, Commissions were appointed by His Highness the Nizam of Hyderabad, at the request of Surgeon-Major Lawrie, to investigate the action of chloroform. The philanthropy of His Highness, in liberally supplying funds for the experiments and the expenses of an expert sent from England, cannot be too highly appreciated, the laudable object of the Commission being, in the words of the Nizam, "to save people's lives." The Commission, after the sacrifice of hecatombs of dogs and monkeys, arrived at the conclusions that, "in every case where chloroform was pushed the respiration stopped before the heart," and that "the administrator should be guided as to the effect entirely by the respiration."

The numerous experiments, and their record, manifest careful and laborious investigation, and merit the thanks of the profession; but the conclusions arrived at cannot be accepted as applicable to the human subject. The result of the experiments has been to direct attention to a subject of vast importance, and to arouse inquiry, which cannot be otherwise than beneficial.

My experience of the administration of chloroform extends from the year of its introduction by Professor Simpson—1847, the year in which I myself commenced practice. For nearly forty-five years I have exhibited that anæsthetic in many thousand cases, often in prolonged operations, and never with fatal consequences. I refrain from reducing the number to figures, as I cannot even give a close approximation to it. In not a few instances alarming, and even dangerous, symptoms have presented themselves, and have strongly impressed me with the risk of trusting alone to respiration as the index of danger. I have watched both pulse and respiration, and ultimately came to regard the state of the pulse as the first signal of danger. I have no new experiments to lay before you, but I shall endeavour to demonstrate from the experiments of others, and from clinical observation and experience, that the state of the pulse is not of less importance than the state of respiration.

as an indication of danger in the administration of chloroform—that it is, indeed, the earliest and most significant danger signal. I shall notice briefly the physiological effects of chloroform on the human subject, and its action on animals as compared with man. The vapour of chloroform inhaled through the pulmonary mucous membrane enters the circulation and is first carried to the left side of the heart. With the next cardiac contraction it circulates throughout the system, and in the coronary blood-vessels. The first effect appears to be slight stimulation of the heart, and of the cerebro-spinal centres. The action of the heart is quickened, but this may be due partly to nervousness; the cerebral functions are stimulated, as evinced by mental excitement—by talking, sometimes singing, laughing, and not infrequently by active movements of the extremities. The stage of excitement is often absent, or of short duration. It speedily merges into one of depression, the pulse becoming weaker and slower, and loss of consciousness, sensation, and voluntary motion supervening. Reflex irritability is the last function to disappear, so that the abolition of the conjunctival reflex, and turning up of the eyes, are regarded as evidence of complete anæsthesia. The respiratory movement continues automatically, when all other reflex movements are abolished. Different individuals are differently affected by chloroform inhalation, and this may be accounted for by constitutional peculiarities. Some inhale quietly, and are speedily brought under its influence; some become excited and toss their extremities about; while others resist and struggle violently. This, however, may be due to the mode of administration, and is a source of danger which I shall presently notice. It is very generally urged that the pulse should not be taken as any guide in the administration of chloroform—that the respiration alone demands attention. This contention seems to be strengthened by the report of the Hyderabad Commission, to the effect that, in animals, respiration always stopped before the heart, and that all danger can be averted by attending to the respiration alone.

Although I do not decry the results of experiments on the lower animals, inasmuch as they afford most valuable indications, I object to hard and fast lines being drawn, and hesitate to accept the *dictum*, “that the effects of chloroform are identical in the lower animals and in the human subject.” It is well known that the effects of various drugs differ much, more especially of narcotics, when administered to the lower animals and to man. The lower animals are not capable of being influenced by the same feelings and emotions as man; and according to the testimony of the Hyderabad Chloroform Commission, operations, liable to produce shock and syncope in man, were singularly devoid of effect in dogs. The effects of chloroform are not uniform in different human individuals, even when administered in the same way, and in certain definite proportions, or even in the same individuals at different times. According to the experiments of the Hyderabad Chloroform Commission, respiration always fails before the circulation, and there is no such thing as chloroform syncope. Experiments on animals reported by other Commissions—the Royal Medico-Chirurgical Society’s Committee of Inquiry, and the British Medical Association’s Committee on Anæsthetics—negative, to some extent, the conclusions of the Hyderabad Chloroform Commission, showing that while in most cases the respiration stopped before the heart, sometimes both respiration and the heart’s action failed simultaneously, and sometimes the heart failed before respiration. The testimony of other observers is not less adverse. Dr. Snow, forty years ago, showed that in animals killed by chloroform inhalation, when the air contained not more than 5 per cent. of vapour, the heart continued to pulsate when respiration

had ceased ; when the air contained 10 per cent. and upwards, death took place more speedily, respiration and circulation ceasing at the same time, there being sufficient vapour in the lungs, the moment the breathing stopped, to paralyse the heart as soon as it was absorbed, and added to that already in the blood. This he terms its eumulative property, when the effects of chloroform increase after discontinuance of inhalation.

It appears that the more immediate effect of chloroform on the heart, or on the respiration, was influenced by the more or less concentrated state in which it was administered ; but even were it proved that chloroform invariably causes death in animals by paralysing the respiration, we have the most positive evidence that failure of the heart's action is the most frequent cause of death in man. An overwhelming amount of evidence has accumulated, and still continues to accumulate, since the first recorded death from chloroform in 1848, to the effect that the occurrence of death in the human subject is almost invariably due to primary failure of the heart, or syncope. Such is, indeed, the principal source of danger, and it is a remarkable circumstance that a diversity of opinion should exist in regard to a question capable of definite solution.

Dr. Sibson was the first, according to Dr. Snow, in commenting on the first four recorded deaths from chloroform, to point out that death was caused by its paralysing the heart ; "that in man, death is usually instantaneous and due to paralysis of the heart ; in animals, death is usually due to paralysis of the muscles of respiration." An analysis by Dr. Snow of the first fifty fatal cases from inhalation of chloroform shows that in forty (40) of these cases death took place by cardiac syncope, or arrest of the action of the heart ; "that in only four the breathing appeared to be embarrassed and arrested by the effect of the chloroform on the brain and *medulla oblongata* at the time when the action of the heart was arrested by it ; and only in one of these cases that the breathing was distinctly arrested by the effect of the chloroform, a few seconds before that agent also arrested the action of the heart." Clinical experience goes to prove that death from failure of the heart is the usual source of danger in the human subject, and is especially liable to occur when the vapour of chloroform is inhaled in a concentrated form, or insufficiently diluted with air. The records of the numerous fatal cases, reported in the various medical periodicals conclusively attest that death by syncope is the most common termination in man ; for not only have the deaths been attributed to failure of the heart, but in cases where *post mortem* examinations were made, such lesions have been described as "fatty heart," "flabby heart," "heart dilated," &c., &c.

It is well known, however, that in many, if not in most cases, where death has supervened no lesion of the heart or of any other organ, has been discovered—that, in fact, the syncope was due to chloroform poisoning.

Although the Hyderabad Chloroform Commission arrived at the opinion that failure of the respiration is the sole source of danger in chloroform administration, the results of their experiments decidedly show that a gradual fall in the mean blood-pressure took place, and continued until respiration gradually ceased, and lastly that the heart stopped beating.

A few quotations from the report will indicate more clearly the tendency to heart-failure : "If chloroform is pushed, there comes a time, not easy to define, when the blood-pressure, and respiration, will no longer be restored spontaneously, although the heart continues to beat after the inhalation is stopped." "As a rule, if the respiration has stopped, or even becomes slow and feeble, at the time when the inhalation is discontinued, and artificial respiration is not resorted to, the fall of blood-pressure will continue until

death ensues." "Artificial respiration was nearly always successful if commenced within thirty seconds after the respiration ceased, very seldom successful if commenced between thirty and sixty seconds after, and always unsuccessful if not begun till after sixty seconds." Seeing the heart continued to act from two to six minutes, or on an average for upwards of three minutes after cessation of the respiration, it might have been reasonably expected that artificial respiration would in every instance have proved successful, even after the lapse of a minute. According to Dr. Laudor Brunton, "the time of grace is only half-a-minute, and if the administrator's attention should be so distracted as to allow this half minute to elapse after the respiration has ceased, the patient will probably die."

It must be allowed that a marked fall of blood-pressure, and slowing of the pulse precede the stoppage of respiration, evidence that the action of the heart is feeble and the circulation retarded. The only two points left open to discussion by the Hyderabad Chloroform Commission are thus stated by Surgeon-Major Lawrie, What is the harmless fall of blood-pressure due to, and what happens to the heart after the respiration failed? These questions have been answered by the results of experiments of various physiologists.

The experiments of Drs. Sibson and Snow at an early stage in the history of chloroform proved that its action was local, affecting the muscular structure of the heart more immediately, as well as through the medium of its nervous supply. The effect on the heart was more pronounced when the vapour was inspired in a concentrated form, when the air contained more than 10 per cent. of vapour. The action of the heart was also paralysed by injecting chloroform into the jugular vein, and by exposing the heart to its vapour. It seems as if the labours of these men in investigating the mode of action, and sources of danger of chloroform, have been forgotten. Dr. Snow's work "On Anæsthetics" still maintains its position as a standard work, and a reliable guide, in the administration of chloroform, the conclusions arrived at being supported by more recent investigations.

The recent experiments of "The Chloroform Committee of the British Medical Association," of Professors Schiff and Goltz, Drs. Wood and Hare, U.S., Dr. Cushny, Professor M'William, and of many others, support the view that paralysis of the heart is brought about by the action of chloroform on the muscular tissue of the heart, or on its nervous ganglia, or through the influence of the vaso-motor nerves on the blood-vessels being abolished. Goltz found that when the vaso-motor nerves were paralysed both arteries and veins became dilated, so that little blood reached the heart, hence the weakness of the pulse. Dr. T. G. Hake, from experiments performed in Professor Schiff's laboratory at Florence, concludes that the force of the circulation becomes so enfeebled by the paralysing action of chloroform on the nerves of the heart and blood vessels that the blood is not brought into contact with the air in the lungs sufficiently often for its renewal. The blood vessels become dilated and congested from paralysis of the vaso-motor nerves, and the circulation is thus retarded.

Professor M'William, of Aberdeen, has shed a light by his recent experiments in regard to the action of chloroform on the heart. He found that a fall of blood-pressure, and a change of left auricle and ventricle took place even before the conjunctival reflex was obliterated, the auricle and ventricle becoming dilated; and that death did occur from failure of the circulation in some cases, all the chambers of the heart being dilated. Among the general conclusions he arrived at, I wish particularly to notice the following:—"The dilatation affected all parts of the heart more or less." "When the heart becomes greatly dilated, it fails as an efficient

force in keeping up the circulation ; its rhythmic movement goes on for a time unchanged in rate, but so feeble as to be ineffective. The failure of artificial respiration to bring about recovery in some cases when collapse has occurred from chloroform poisoning, and when artificial respiration has been begun directly the natural respiration ceased, is in all probability due mainly to the distended and enfeebled state of the heart, which is unable to maintain the circulation. The fall of blood-pressure under chloroform is, in the earlier stages, usually due to the depressing influence of the drug upon the vaso-motor centre. The later stages of a great fall of blood-pressure are commonly associated with a failing condition of the heart, as well as of the vaso-motor centre."

The rythmical movements of the heart after the cessation of respiration, observed and tested by the movements of a needle inserted through the chest wall into the heart, doubtless led the members of the Hyderabad Chloroform Commission to suppose that the action of the heart continued in its normal condition. The absence of pulse in the femoral artery, while the movements of the heart continued, proved that the heart was inefficient to propel the blood to the extremities.

From experiments made in the physiological laboratory of Bern University, Dr. Cushny found "that the heart needle was not an accurate index of the heart beat, as, in some cases, it continued to vibrate after paralysis of the ventricles had taken place, owing to the continued pulsation of the auricles communicating a motion to the ventricles, through which the needle passed." He also states that "the chances of recovery after paralysis of the respiration, depend entirely on the condition of the heart, and therefore on the concentration in which the drug has been used. If, as in the case of rabbits, the heart is very much weakened by very concentrated administration, it is impossible to restore the respiration. In dogs, the heart is comparatively unaffected. The animal can always be revived, provided the necessary measures are taken within a reasonable time. The essential point is, that the drug be given in sufficient dilution to avoid its action on the heart."

Abundant evidence from experiments on animals has now been adduced to prove that the heart is directly affected by chloroform inhalation, and that it speedily becomes paralysed when chloroform is exhibited in a concentrated form. Clinical observation and experience in regard to the effect of chloroform on the human subject are strictly in accord with those conclusions,

The following deductions may be legitimately drawn from the facts recorded:—Respiration and circulation are mutually dependent and adjuvant, and the cessation of the one is quickly followed by that of the other. So long as respiration continues normal, and the action of the heart is efficiently maintained, the normal supply of healthy blood is sent to the cerebro-spinal centres. Respiration becomes gradually shallow and weak from the effects of chloroform on the respiratory centre, and on the pulmonary plexuses of nerves ; and the action of the heart is diminished in force, and frequency, by its effect on the vaso-motor centre and cardiac ganglia. When the function of the vaso-motor nerve is partially suspended, the blood vessels become relaxed and distended with blood ; the blood accumulates in the peripheral vessels, more particularly in the abdominal, portal, and thoracic veins, and distends the right side of the heart. The capillaries of the lungs, it may be supposed, are affected in the same way as the systemic capillaries, and become dilated and distended with blood. The congestion of the lungs becomes still further increased by the

obstruction of the circulation through the heart, from gradually increasing paresis of that organ. So long as respiration continues, and the heart acts even feebly, chloroform vapour is absorbed and conveyed to the left side of the heart. As the heart becomes still more enfeebled by chloroform narcosis, its left chambers, dilated and distended, cease to contract with power, and are inefficient to propel the blood. The distention of the left auricle leads to obstruction of the pulmonary veins, and the congestion of the lungs is augmented, not only by failure of the *vis a tergo*, but by obstruction *a fronte*.

There is reason to infer that cessation of respiration may thus begin at the heart, being brought about by apnœa from pulmonary congestion, and probably, in some measure, by anæmia of the brain and medulla. Cessation of the pulse, and pallor of the lips, followed by sudden syncope, indicate paralysis of the heart, the direct result of chloroform toxæmia. Cessation of the pulse with lividity or cyanosis of the face, followed by instantaneous death, betokens heart failure, and stoppage of the respiration with congestion of the lungs. The movements of the heart continuing so long after the stoppage of respiration in dogs, while inefficient to expel the blood, may be partly accounted for by the fact that the heart in mammalia continues to beat for one or two minutes after being removed from the body, and in the case of reptiles for hours.

THE INDICATIONS AND SOURCES OF DANGER OF CHLOROFORM NARCOSIS.

The effect of chloroform in any given case will much depend on the temperament and idiosyncrasy of the patient, and on the mode of administration of the anæsthetic. It is a remarkable fact that the weak, and delicate, are not so liable to fatalities from chloroform inhalation as the strong and robust. This may probably be due to greater care being taken in its administration on account of their weakness, to their being brought under its influence very gradually, and to their not resisting or struggling. Again, fatal effects follow much more frequently when chloroform is exhibited for simple or trivial operations, than in prolonged or major operations. Why is it thus? Is it to be assumed that it is owing to some fault in the mode of administration, or to carelessness, or inattention, on the part of the chloroformist?

Too frequently we find that persons in apparently robust health, in the vigour of youth, and the midst of usefulness, succumb to the effects of chloroform, given to relieve pain, in some trifling operation; often even before the operation has been commenced. Without doubt, deaths from chloroform do occasionally occur owing to faulty administration, or to inattention, when the chloroformist is required to assist the administrator, or his mind is directed to the operation, instead of being solely devoted to the condition of the patient.

The period of greatest danger appears to be in the initial stage, or at the commencement of inhalation, before the patient has been thoroughly brought under its influence, and not during the progress of even a prolonged operation. It has been stated that the danger of failure of the heart's action, from the depressing effect of chloroform, depends on and is in proportion to the length of time of inhalation and consequently of the operation. This, however, is not the case. If chloroform is given sufficiently diluted with fresh air, and respiration continues normal, the vapour of chloroform is exhaled, as well as inhaled, and the blood does not become so saturated as to endanger the heart. The danger is, in a

great measure, dependent on the amount or degree of concentration of the vapour inhaled; as the vapour, if inhaled insufficiently diluted with air, affects the heart more directly, and may lead to sudden paralysis of that organ.

The immediate causes of death in chloroform toxæmia, are syncope and apnœa. In the large majority of cases death takes place from sudden syncope in the human subject, due to paralysis of the heart. Death may also result from syncope, brought about by the combined effects of sickness of the stomach, and the depressing influence of chloroform on the heart. This stomach sickness, or nausea, has been stated "to be only unpleasant and inconvenient, desirable to avoid, but not attended with any danger." It has, however, proved a real danger, inasmuch as, in not a few cases, suffocation has been induced by food being drawn into the glottis during the effort of vomiting. But, apart from this, when there is no food in the stomach, there is, in my opinion, a real danger attending sickness, unless the pulse is watched. I have frequently observed the pulse become slow and weak, and the lips blanched, and have thus been led to withdraw the chloroform instantly, and then the faintness was followed by vomiting. If, instead of withdrawing it, chloroform had been pressed, as I have somewhere seen advocated, "to stop the contractions of the stomach," it might have resulted in stoppage of the heart's action.

I am strongly of opinion that, when a patient is in a fainting condition, even a small dose of chloroform may so affect the heart as to cause complete cessation of its action, and that the pulse gives the first indication of danger, the first warning, respiration, if at all, being but little influenced.

The administration of chloroform in the sitting posture is not unattended with danger, on account of the increased labour imposed on the heart to propel the blood to the head. Owing to the tendency to heart-failure anæmia of the brain is likely to result from deficient supply of blood. It is, also more difficult, or tedious, to bring a patient in the sitting position under the influence of chloroform, and care and constant watching are required on the part of the administrator.

In all cases of danger from failure of the heart, the state of the pulse will be found to indicate the necessity of withdrawing the chloroform and admitting fresh air.

Deaths from apnœa are only occasionally met with. They arise from spasms of the glottis, and diaphragm, obstructing the respiration, and are sometimes attributed to reflex-action in some operations, ligaturing hæmorrhoids, &c., when the patient is not sufficiently anæsthetised. The spasms, and struggling, generally met with, are caused by the inhalation of chloroform in a concentrated state, by its being pressed on the patient, at the commencement, insufficiently diluted with atmospheric air. From this cause apnœa and cardiac paralysis are liable to occur almost simultaneously, and the right ventricle is said to be found *post mortem* distended with blood, showing that the action of the heart ceased in diastole. Apnœa is sometimes attributed to the tongue falling back and occluding the glottis, when a patient is lying on the back under the influence of chloroform narcosis: from this source I have never seen any cause for alarm.

PRECAUTIONS TO BE OBSERVED IN ADMINISTERING CHLOROFORM.

It will be readily admitted that the chloroformist should give his whole attention to his patient,—should see that the chloroform is pure, that the patient has not recently eaten food, that he is placed in the recumbent posi-

tion, or in such a position as not to obstruct respiration, all articles of clothing being loose about the neck, chest, and abdomen. The means of administration, or apparatus used in inhalation, is of little importance, provided it can be readily applied, and removed, as occasion demands. Many inhalers have from time to time been devised, but I regard the use of a table-napkin, or towel, folded in the form of a cone, with or without an aperture at the apex, such as was originally proposed by Professor Simpson, as well adapted for the purpose. It can be readily obtained, can be held with one hand, while the other is free to be applied to the pulse of radial or temporal artery, as may be most convenient. One-half to a drachm of chloroform should be sprinkled on the napkin, as required, so as not to moisten the border likely to come in contact with the face. I never find it necessary to lubricate the nose, and mouth, with any unguent or oil, as some do. Indeed, the inhaler should not be brought into such close apposition with the face, as to prove a source of irritation. In commencing inhalation, always allow sufficient space for the free admission of atmospheric air, so that the vapour may be diluted and its effect may be gradually produced, so as to avoid exciting cough or struggling. Allowance should be made, in the warm season of the year, for the effect of temperature in rendering chloroform more volatile, and thus causing the air to become more saturated with the vapour. Patients should be gradually brought under the influence of chloroform until its full effect is produced, and then very little chloroform will be required to maintain insensibility. The vapour may be diluted with more air by withdrawing the inhaler to some extent, or inhalation may be intermitted for two or three inspirations occasionally.

The state of the pulse should be carefully watched: it gives the first indications of danger. When the pulse becomes weak and slow, perhaps irregular and intermittent, fresh air should be freely admitted; when, moreover, respiration becomes shallow and feeble, perhaps stertorous, the inhaler should be withdrawn altogether for a short time. In prolonged operations, special care should be taken that the vapour inspired is sufficiently diluted with fresh air, so as to guard against sudden syncope, the most frequent cause of a fatal termination in the human subject. "The danger does not consist in slowing and stoppage of the heart by vagus inhibition," but in the tendency to paralysis of the heart from the influence of chloroform on the vaso-motor nerves, and on the nervous ganglia, and muscular substance, of the heart. In the case of weak or feeble subjects, some stimulant might be given with advantage previously to chloroform inhalation, and, when an operation is likely to be protracted, the subcutaneous injection of a solution of morphia, as originally recommended by Claude Bernard, may be given with great advantage. The addition of atropine to morphine, as recommended by Professor Fraser, has been more generally used, inasmuch as atropine is said to act as a cardiac stimulant. Less chloroform is required to maintain the state of insensibility, and, it is said, the tendency to emesis is relieved, if not prevented.

MEASURES TO BE ADOPTED IN SUSPENDED ANIMATION FROM CHLOROFORM

Seeing that treatment for suspended animation, in cases of chloroform toxæmia, seldom proves successful, the utmost attention and care should be given to render it unnecessary. With that view, chloroform should never be inhaled in such a concentrated form as to produce a sudden effect, a sudden lowering of blood-pressure, and paralysis of the heart. Anæmia of the brain, and distension of the right side of the heart are the most common

post mortem appearances met with, and measures tending to counteract and relieve these conditions claim attention. It has been found in practice that no time should be lost in carrying out the measures resolved on. The head should be lowered and feet elevated, and artificial respiration commenced without delay, fresh air being freely admitted, and any obstruction to respiration removed.

Nélaton's plan of inverting the body and artificial respiration is, without doubt, most conducive to resuscitation in chloroform poisoning. By this means the blood will gravitate towards the head, and the action of the heart may be roused to contract, and send a supply of blood to the brain, and medulla, so as to stimulate the cardiac and respiratory centres.

No successful issue has followed the employment of galvanism, that I have heard of; and certainly not more benefit can be expected to result from nitrite of amyl inhalation, which causes dilatation of the peripheral blood-vessels, a condition already existing to the fullest extent, and which it is desired to remedy. Nitrite of amyl is, therefore, contra-indicated. The injection of ether subcutaneously, or of ether and strychnine, is more rational, and likely to prove of benefit, artificial respiration being kept up.

Mr. Bader, the Ophthalmic Surgeon, Guy's Hospital, states that, out of a large number of cases (3,224), some presented serious symptoms, becoming blue in the face, with stertorous breathing, and irregular pulse; seven became pale suddenly, with respiration and pulse stopping. In all these cases the chloroform was removed, and the patient slowly, and gently, turned to his left side. Patients recover rapidly when placed on the left side, due, it may be, to the support given to the heart, or to a change in the position of the tongue. This, he states, is the sole means adopted at Guy's for the last six years.

Professor Schiff, Florence, is of opinion that the force of the circulation is enfeebled by paralysis, and dilatation, of the peripheral blood-vessels, so that the blood is not returned to the heart in sufficient quantity to stimulate it to contraction, and is, consequently, not renewed fast enough in the lungs, thereby affecting the respiration. He proposes to compress the abdomen, and apply ligatures to the upper and lower extremities, so that the dilatation of the blood-vessels may be compensated and circulation established.

Inversion of the body to an angle of about 45 degrees, turning it on the left side, and commencing artificial respiration by Marshall Hall's ready method, if speedily resorted to, meet all the indications, and are likely to prove effective in restoring animation.

Very recently, the reprint of a paper on "Resuscitation in Suspended Animation following the Administration of Chloroform," read before the Illinois State Medical Society, in 1891, by Dr. Prince, was sent me. The means recommended, although somewhat ludicrous, and related in a serio-comic style, struck me as being most appropriate to meet the indications in view. He favours the method of artificial respiration, recommended by Dr. Marshall Hall, as calculated to stimulate the functions of the heart, and of respiration at the same time, by aiding to expel the blood from the heart, and to promote respiration.

The Marshall Hall method failing to restore animation in a desperate case, Dr. Prince, fertile in resources, adopted a new method of resuscitation, based on Nélaton's method of inverting the body. He seized the patient, a boy of 14 years, by the ankles, his knees being flexed over the Doctor's shoulders, with head and arms dangling towards the floor. In that position he subjected him to "a double quick motion around the operating room, and after about three minutes the sounds of restored respiration were heard."

The Doctor further states, " Each step was taken with a springy motion, by which the weight of the intestines, resting upon the diaphragm, would be alternately applied and removed with the tread, the effect of which would be calculated to stimulate the heart, and force the blood along its channels, while the air was simultaneously changed in the lungs." Other three cases are related, one, a young woman of great weight (140 lb.), another, a physician, who were subjected to similar treatment with alike favourable results. As it appears that in two, of the four cases reported, the Marshall Hall method of restoring animation was had recourse to, without success, before adopting the method described, the success of the new method appears to be the more remarkable, seeing a considerable time (not noted) was said to have elapsed before it was commenced. That fact caused me to hesitate in crediting the report, but the circumstantiality in detail, the names and dates, &c., forbade my entertaining any doubt of its genuineness.

From the preceding remarks it will be apparent that, in my opinion, chloroform is the best anæsthetic yet discovered; that it is quite safe if judiciously administered and its action closely watched; that the pulse, and not the respiration, gives the first indication of danger, and ought, therefore, not only to be constantly under the fingers, but to occupy the attention. It now only remains for me to urge the necessity of appointing well-qualified anæsthetists in all large hospitals, especially in all hospitals attached to medical schools. In well-conducted hospitals such appointments have been already made. I am sorry to say we lag behind in Melbourne. Notwithstanding the reiterated suggestions of our worthy Coroner (Dr. Youl), and the repeated requests of the Medical Staff, the Committee of Management of the Melbourne Hospital have not yet seen fit to make such an appointment. If human life is to be valued, if means are to be adopted to afford relief to suffering, and prolong life, a responsible officer should be appointed to all large hospitals. It should be his duty to give systematic, and practical, instruction in anæsthetics to the students in attendance, as well as to superintend, or administer, the anæsthetic in all operations. Students should also be required, at their final examinations for degrees in medicine, to give evidence of their special practical knowledge of the administration of anæsthetics.

Notes on Lead-poisoning as Observed Among Children in Brisbane.

By the Hon. Visiting Staff and Resident Surgeon, Brisbane Hospital for Sick Children, viz., J. LOCKHART GIBSON, M.D., Edin.; WILTON LOVE, M.B., Edin.; DAVID HARDIE, M.D., Aberdeen; PETER BANCROFT, M.B., Sydney; A. JEFFERIS TURNER, M.D., Lond.

DR. J. J. PUTNAM in Keating's "Cyclopædia of the Diseases of Children," published in 1890, says in the commencement of a long and exhaustive article upon lead-poisoning, "The justification for the present article is found not in the abundance, but in the meagreness of the present accumulation of facts relating to children, and to the importance of taking steps towards increasing it." Those interested in the subject would do well to refer first to the article on lead-poisoning in Gower's "Diseases of the Nervous System," and secondly to the article quoted above. It would not be the province of a paper such as ours to do more than report our cases, and point out the special points of interest in them. Though its symptoms are perfectly characteristic and easily recognised, lead-palsy in children appears to be frequently overlooked. It has not, as far as we know, been hitherto recognised among children in Brisbane, though cases must have occurred besides those which have come under our notice. Indeed, one very well marked case was treated by one of us—but not diagnosed—in the Children's Hospital in January and February of 1890. This case ended in complete recovery from double wrist and foot-drop, together with paralysis and wasting of thumb muscles and interossei of hands. It has not been included among the ten cases which form the subject of the present paper, and which came into the hospital between December, 1891, and July, 1892. Of these, several were of long duration, and had undergone much medical treatment without apparently ever having had their real nature elucidated. The chief reason for this failure of diagnosis is no doubt that lead-poisoning was never thought of as a possible cause of the symptoms. But there is a subsidiary reason in the fact that lead-palsy in childhood presents certain peculiarities in its distribution, which differ from the common, and typical, form of the disease in the adult. We will refer, later on, to those of the points of difference which have been already recorded, and to those which have been independently observed by us, and, as far as we know, recorded now for the first time for children. As the cases which have come under our notice form a moderately large group, it is fair to surmise that, as these peculiarities have been universal in them, they must probably apply, pretty generally, to lead-palsy in children.

It will be convenient, after giving a brief summary of the history of these ten cases before coming under admission, to consider the paralysis and electrical reactions of the affected muscles, and to conclude with the other symptoms due to plumbism. The history was always of a gradual onset, foot-drop being invariably the first paralytic symptom observed. The duration of cases varied from six weeks to several months before admission. In two cases there was a history over several years. In these, a first attack was recovered from, and succeeded by a relapse after long intervals.

Paralyses.—In all ten cases the paralyses had an extensive yet characteristic distribution. Three groups of muscles were affected in every case, namely: (1.) Extensors of the fingers. (2.) Tibialis anticus and long extensors of toes. (3.) The muscles forming the bulk of the thenar eminence, abductor, opponens, and flexor brevis pollicis. Not only were there no cases of simple wrist-drop, uncomplicated by ankle-drop, and wasting of balls of thumbs, but it is important to remark that, in nine of the ten cases, the first group of muscles was affected to a less extent than the latter two. The one exceptional case was a boy aged twelve, who was, of all the cases, the one nearest to adult life. In him there was complete palsy of extensors of fingers, and wrists, with slighter affection of the other groups of muscles.

(1.) In all cases the extensors of the fingers were paralysed, either wholly, or to a considerable degree. With the one exception mentioned, the extensors of the wrists escaped, at least in every case in which attention was directed to this point. The carpal extensors act, normally, only when the fingers are clenched; when the fingers are extended only the digital extensors act in extending the wrist. Consequently with the fingers extended there may be complete wrist-drop, while with the fingers clenched the wrist can be extended without difficulty. (See Gower's "Diseases of the Nervous System," vol. ii., p. 871.) In no case was palsy of the supinator longus observed.

(2.) The abductor, opponens, and flexor brevis pollicis were always wasted, so that the thumbs were functionally almost useless. The adductor pollicis appeared healthy in some cases, in others it also was wasted. Occasionally there was wasting of the hypothenar eminences, and, in several, well-marked paralysis, and wasting, of the interossei.

(3.) Paralysis, usually with wasting of the tibialis anticus, and extensor longus digitorum, was invariable. In one case all the muscles below the knee were flabby and wasted. The peronei showed a very marked degenerative reaction to the electric current in one case that was tested especially. Probably affection of the peronei would have been noticed more often if it had been specially looked for.

No muscular paralysis, beyond those noted, was found in any case.

ELECTRICAL REACTIONS.

These were carefully tested in three cases, which will be briefly described. The reaction of degeneration was well marked in the paralysed muscles, but varied in form and degree. In all faradic irritability was lessened, or abolished. Sometimes galvanic irritability was slightly increased, the anodal closure disproportionately, so as to equal the kathodal closure (Case iii, Extensor of fingers KCC 1, ACC 1 m.a.), or the irritability to kathode was diminished so as to be about equal to that to the anode (Case ii, Peronei KCC $3\frac{1}{4}$, ACC 3), or, again, the kathodal irritability was diminished, so as to be distinctly less than the anodal, which was normal, or less than normal. (Case i, Tibialis anticus KCC $4\frac{1}{2}$, ACC $3\frac{1}{4}$. Extensor digitorum manus KCC $7\frac{1}{2}$, ACC 4), thus giving a complete qualitative reaction of degeneration.

It is interesting to note that, in one or two cases, muscles which were not paralysed, but apparently normal in function, showed slight qualitative change. Firstly, by diminution of anodal opening, as compared to anodal closure irritability (Case i, Flexor carpi ulnaris, and flexor digitorum KCC 1,

ACC $2\frac{1}{2}$, AOC $5\frac{1}{2}$), or by diminution of kathodal closure so as to approximate to anodal closure (Case iii, Gastrocnemius, right, KCC $1\frac{3}{4}$, ACC $2\frac{1}{2}$, left, KCC $2\frac{1}{4}$, ACC $2\frac{1}{2}$). This occasional occurrence of reaction of degeneration, in muscles apparently not paralysed, is mentioned by Erb as having been previously observed in lead palsy (Electro-Therapeutics, p. 501). It is seen most markedly in Case I (Gastrocnemius KCC $4\frac{3}{4}$, ACC $2\frac{3}{4}$).

Case I.—M.E.D., girl, aged 7 years.

History on Admission.—Has been out of health for the last six months, being heavy and languid; complaining of slight pains in the stomach, and very costive; three months ago mother first noticed dropping of the toes, and weakness of the hands about the same time; last week she had rather severe pain in the abdomen, lasting fifteen minutes; she is always very costive; is remarkably fond of sweets and of chewing things, but no history of lead can be obtained.

Present Condition.—Marked foot-drop; seems to have no power at all in flexors of ankles and extensors of toes; these muscles are wasted; knee jerks present; partial weakness of extensors of fingers; with fingers extended wrist can be thrown up with an effort, but not kept up; good power in carpal extensors when fingers are clenched; short muscles of thumb much wasted, including adductor pollicis; little finger muscles wasted; interossei appear to act well on right side, not perfectly on left; somewhat poorly nourished, and slightly anæmic; tongue slightly furred. There are very minute traces of a blue line on gums, opposite the upper central incisors.

A large sample of urine collected, immediately on commencement of a course of iodide of potassium, was given to a public analyst, and found by him to contain distinct traces of lead.

Electrical Reactions.—The paralysed muscles all show diminished faradic irritability. The extensor muscles of forearm contract feebly to a much stronger current than causes strong contraction of the flexors. No contraction obtained of small muscles of hand. Anterior muscles of leg contract very feebly on right side to the strongest obtainable current; on left side no distinct contraction is obtainable. Calf muscles react feebly to a weaker current.

Galvanic Current—Right Side.—Biceps, KCC $1\frac{1}{4}$, ACC 3, AOC $3\frac{3}{4}$ milliamperes; flexor carpi ulnaris, KCC 1, ACC $2\frac{1}{2}$, AOC $5\frac{1}{2}$; flexor digitorum, KCC 1, ACC $2\frac{1}{2}$, AOC $5\frac{1}{2}$; extensor digitorum, KCC $7\frac{1}{2}$, ACC 4 interossei, KCC $1\frac{1}{2}$, ACC 2; abductor minimi digiti, KCC $1\frac{1}{2}$, ACC $1\frac{1}{2}$; abductor pollicis, KCC 6 (?), ACC $2\frac{1}{4}$; tibialis anticus, KCC $4\frac{1}{2}$, ACC $3\frac{1}{4}$; extensor longus digitorum, KCC $3\frac{3}{4}$, ACC $4\frac{1}{2}$; peroneus brevis, KCC 10, ACC 6; peroneus longus, KCC 10, ACC 5; gastrocnemius, KCC $4\frac{3}{4}$, ACC $2\frac{3}{4}$.

Case II.—E.S., girl, aged 8 years.

She was quite well until three years old, when she was taken ill with pains in the legs. Three weeks later it was found that the legs were powerless. It was twelve months before she could walk much. Four months ago she had severe pain in the stomach, which made her scream and brought on convulsions three times. The fit began by her saying there was something in front of her eyes. Then one foot began to twitch. A twitching spread up one side and then affected the whole body. After that for some days she passed blood, and pieces of "flesh," by the bowel.

On Admission.—She was markedly anæmic, with a sallow, yellowish complexion. There was no blue line on gums, though teeth were uncleaned. There was extreme talipes equinus on both sides due to contracture of calf muscles. This was cured by tenotomy of the tendines achillis. She had then extreme ankle-drop, and total paralysis of extensors of toes, and flexors of ankle, with evident wasting of these muscles. Calf muscles, and all leg muscles below knee, are wasted somewhat, the former very flabby. Partial wrist-drop; with fingers extended the wrist can be half-extended only with effort. When, however, the hand is clenched the carpal extensors have good power. Extreme wasting of short muscles of thumbs, including the abductors. Wasting also of all the short muscles of the hand, including the interossei, and little finger muscles. When the long muscles contract, the hand assumes the position of a mild form of the main en griffe. Knee jerks well marked.

Electrical Reactions.

Right Arm.—Deltoid, biceps, triceps, supinator longus, flexors of forearm contract to a weak faradic current; extensors of fingers to a moderately strong current, and also abductor minimi digiti. No other short muscles of the hand contract to strong faradic current. Biceps, KCC $\frac{1}{2}$, ACC 1 milliamperes; deltoid, KCC $\frac{3}{4}$, ACC $1\frac{1}{4}$; triceps, KCC $1\frac{1}{4}$, ACC $1\frac{3}{4}$; flexors of fingers, KCC $2\frac{1}{2}$, ACC $2\frac{1}{4}$, AOC 7; extensor digitorum, KCC $2\frac{1}{4}$, ACC $2\frac{3}{4}$; extensor carpi ulnaris, KCC $2\frac{1}{4}$, ACC $2\frac{1}{4}$.

Left Arm.—Faradic current as in right. Biceps, KCC $\frac{1}{2}$, ACC $1\frac{3}{4}$; triceps, KCC 1, ACC $1\frac{1}{2}$; deltoid, KCC $1\frac{1}{4}$, ACC 2; flexors of fingers, KCC 1 to $1\frac{1}{2}$, ACC 1 to $1\frac{1}{2}$, AOC 6; extensor digitorum, KCC $2\frac{1}{2}$, ACC 3; extensor carpi ulnaris, KCC $2\frac{1}{2}$, ACC 3.

Right Leg.—Quadriceps and hamstrings react to a weak faradic current. Gastrocnemius to a much stronger current. Peronei, tibialis anticus, extensor longus digitorum, not to the strongest current. Rectus, KCC $2\frac{1}{2}$, ACC $5\frac{1}{2}$; gastrocnemius, KCC 5, ACC 6; tibialis posticus, KCC 5, ACC $5\frac{1}{4}$; peronei, KCC 5, ACC 5; tibialis anticus, KCC $5\frac{1}{2}$ feebly, ACC $4\frac{1}{2}$ but feebly even to ACC 11; extensor longus digitorum, KCC 8 a flicker, ACC 8 a flicker.

Left Leg.—Gastrocnemius, and tibialis posticus, react to a moderately strong faradic current. Peronei to a still stronger current. Tibialis anticus, and extensor longus digitorum, not to any faradic current. Gastrocnemius, KCC 5, ACC $5\frac{3}{4}$; tibialis posticus, KCC 5, ACC $5\frac{3}{4}$; peronei, KCC $3\frac{1}{4}$, ACC 3; tibialis anticus, KCC $4\frac{1}{2}$ very feebly, ACC $4\frac{1}{4}$ very feebly; extensor longus digitorum, KCC 7 very feebly, ACC 8 very feebly.

Case III.—M.J.E., boy of 12 years.

Was perfectly healthy seven months ago, very energetic in play, and fond of cricket. Had then an illness which kept him in bed three or four weeks, always wanting to sleep, and complaining of pain in the abdomen. Five months ago went back to school, and appeared all right for about a month. Since then, has been gradually losing use of legs and hands, weakness of legs being first noticed. Last three days he has complained of pain in legs, and hands, and is quite unable to walk. He says he has always chewed the tin-foil covering of chocolate, &c., to make pellets to pelt the other boys. Does not remember when he first did this. "All the boys do it."

Present State.—Partial ankle-drop, with weakness of anterior muscles of leg. Complete wrist-drop, with complete loss of power over both digital

and carpal extensors. Posterior forearm muscles wasted. Supinator longus not paralysed. Left short thumb muscles wasted, except adductor pollicis. Right short thumb muscles flabby, and slightly wasted. Weakness of interossei. Knee jerks normal. Slightly anæmic. Thin blue line distinguishable opposite several teeth, especially upper and lower central incisors.

Electrical Reactions.

Faradic, Right Arm.—Deltoid, biceps, triceps, flexors of forearm and wrist react to a weak current. Anconeus reacts to a strong current. Other extensors of forearm not to the strongest current.

Right Leg.—Gastrocnemius, and peronei, react to a moderate current. Tibialis anticus, and extensor longus digitorum, do not react to strongest current.

Galvanic Unparalysed Muscles.—Deltoid (right), KCC $1\frac{1}{2}$, ACC 3, milliamperes; triceps (right), KCC 1, ACC $2\frac{1}{2}$; biceps (right), KCC 1, ACC 3; flexors of forearm (right), KCC $\frac{3}{4}$, ACC $1\frac{1}{2}$, AOC 2; gastrocnemius (right), KCC $1\frac{3}{4}$, ACC $2\frac{1}{2}$; gastrocnemius (left), KCC $2\frac{1}{4}$, ACC $2\frac{1}{2}$; peronei (right), KCC 1, ACC 2.

Paralysed Muscles.—Extensor digitorum (right), KCC $1\frac{1}{2}$, ACC 2; extensor digitorum (left), KCC 1, ACC 1; extensor carpi ulnaris (right), KCC 1, ACC 1; extensor carpi ulnaris (left), KCC 1, ACC 1; tibialis anticus (right), KCC 1, ACC $1\frac{1}{2}$; tibialis anticus (left), KCC 1, ACC 1; extensor longus digitorum (right), KCC $2\frac{1}{4}$, ACC $1\frac{1}{2}$; extensor longus digitorum (left), KCC 1, ACC $1\frac{1}{2}$.

A sample of the urine of this case, collected after the administration of iodide of potassium, was analysed by Dr. Love and found to contain a minute but distinct proportion of lead.

One case of clinical interest and importance is worthy of notice, as it has been under observation by one of us since April, 1889, and until lately undiagnosed. The patient, a girl aged seven years, suffered at that date from vomiting, colicky pains in the abdomen, and diarrhœa. This illness lasted a week, and had been preceded by constipation. In addition she had symptoms which appeared to be due to gastro-intestinal irritation, viz., starting and screaming in sleep, awaking in a fright, excessive grinding of teeth, and occasional rises of temperature. As these pointed to the possibility of intestinal parasites, various vermifuges were tried, but without success. Considerable loss of power in the legs and ankles developed, but was ascribed to systemic weakness. Change of air, sea-bathing, and shampooing, with careful restriction of diet, slowly succeeded in restoring health. But there has been periodic recurrence of the attacks about every six months, latterly with marked foot and wrist drop, and also with a condition of cramp of the calf muscles, causing temporary talipes equinus, and persisting for some weeks. In these latter attacks colicky pains have been less prominent. Latterly iodide of potassium has been used successfully. The patient is one of a family of five, who have resided in the same house since arrival in the Colony in 1886. No other member of the family has been, at any time, similarly attacked.

The form of paralysis in the preceding cases has, for the most part, a greater resemblance to that called by Gowers "primary atrophic" than to the more common degenerative form. It resembles the "primary atrophic" in showing muscular wasting as a very early symptom, and to an extent beyond what would be expected from the evidence of nerve degeneration; also, in

the fact that the galvanic excitability of the muscles, though as a rule qualitatively altered, shows nearly always an absolute diminution to kathodal closure, and tetanic contractions were not observed during passago of the current. It has resemblance to the degenerative form in this, that some of the muscles in some of the cases show an absence of excitability to faradic stimulation, but always only those muscles which have markedly degenerated, and in no case have all the degenerated muscles failed to react to faradism. Primary atrophy, according to the article by Putnam, has hitherto only been studied in adults. It affects, according to both Gowers and Putnam, pre-eminently the small muscles of the hands, but often other groups as well. Its course is chronic, and the prognosis less favourable than in the neuritic or degenerative form. It will be seen, therefore, that our cases have given us an opportunity of recording observations in primary atrophy, if the above statements be correct, for the first time in children; and also of recording the very interesting fact that, in a series of ten cases, the small muscles of the hand have been invariably affected, which we have not been able to find as an observation recorded for children. It seems to us likely, that further observation will establish the particular susceptibility of these muscles in children to the influence of lead. We have also been able to support the evidence brought forward by Putnam, of "the striking fact that whereas, in adults, the paralysis, in the vast majority of cases, affects the upper extremity, and especially the extensors of the hand, either alone or far more than those of the foot, this appears not to be the case in children." In every case seen by this writer, or found described by him, the legs were affected as much as, or more than, the arms, and usually earlier. He remarks that, "it would be premature to offer an explanation of this relatively greater tendency of lead poisoning in children, to affect the lower extremities, since the cases, on which the observation is based, are still few in number. It will, however, be an interesting matter for further inquiry, and, if the observation is confirmed, it may lead to conclusions of general interest."

OTHER SYMPTOMS.

We will deal very briefly with the other symptoms observed.

Anæmia was observed always, but in very varying degree. Usually it was well marked, but in one or two cases only slight. In one case (Case 11), which appeared to be a second attack, the first attack having occurred five years before, there was great anæmia, with the "earthy" complexion common in adults who have been exposed to lead.

The blue line in the gums is, as authors are agreed, of uncertain occurrence in childhood. It was not observed in several of our cases. When present, it was so only in a faint degree, opposite a few isolated teeth, and, although unmistakable, would certainly escape any but the most careful observation.

Pains in the limbs, with soreness of the muscles, were occasionally observed. One case, related above, had very curious spasmodic contractions of the calf muscles, accompanied by pain, whenever these were extended, as in attempting to stand; but this tendency to cramp was intermittent. One day it would be present, the next two or three days extension would be painless and unresisted. It must be distinguished from the permanent contracture present in one of our cases, which necessitated tenotomy.

Lead-colic in its typical form was not present in our cases, but in four or five there was a very clear history of gastro-intestinal seizures, which usually

preceded the symptoms of paralysis. These consisted of attacks of severe abdominal pain, usually accompanied by vomiting. Sometimes there was constipation during the attack, but, more commonly, a somewhat free action of the bowels, of a dysenteric character. In two cases convulsions accompanied the attack. Although such attacks in children are not uncommon as a result of indiscretions in diet, a careful perusal of the history of our cases renders us confident that, in them, plumbism was the exciting cause. It would be, therefore, well to bear this possibility in mind when treating cases showing like symptoms.

DIAGNOSIS.

If the characteristic distribution of the palsy is borne in mind, the observer cannot fail to recognise the nature of the disease. The history shows a gradual onset, foot-drop usually being the first symptom noticed. This is in direct contrast to the sudden onset of infantile paralysis (anterior poliomyelitis), the most common cause of paralysis and muscular wasting in childhood. Independently of mode of onset, the distribution of the paralyses due to lead should distinguish the case.

Peripheral neuritis due to alcoholism, causes very nearly the same form of paralysis; but this is a disease of adults and scarcely enters into the diagnosis.

The early wasting of the muscles of the hand resembles closely, that met with in progressive muscular atrophy; but the associated wrist and foot-drop are sufficient to prevent confusion. This, again, is a disease which is at least extremely rare, if known at all, in early childhood.

We may here mention that the urine was carefully analysed for lead in three cases. In one case the selected sample was thrown away by mistake, and the analysis of a subsequent sample was negative. In this case the symptoms of paralysis were slight, and rapidly disappearing. In two cases which have been described, the urine, after the commencement of the administration of iodide of potassium, was analysed by two independent observers, and found to contain small but distinct traces of lead.

TREATMENT.

This consisted in the first place of admission into the hospital, by which means the further ingestion of the poison could with certainty be prevented. Iodide of potassium was given three times a day, and the wasted muscles regularly massaged. If we had been able to employ electrical treatment more regularly and thoroughly, convalescence would probably have been more speedy. Every case improved under treatment, and those that have been long observed recovered completely. Usually distinct commencement of improvement could be observed by the end of the first month of treatment. The improvement progressed very gradually, and almost imperceptibly. In the worse cases six or eight months elapsed before complete recovery. The foot-drop often persists several months after the other palsies have disappeared. We may fairly conclude that although muscular wasting be great and widespread, the prognosis is usually favourable in early life.

SOURCE OF THE POISON.

The most important practical question in relation to these cases is that of origin. Hospital patients, who come to us apart from their home surround-

ings, and can give very imperfect replies to our questions, are unsatisfactory bases for this inquiry. We doubt whether it would be safe to assume, on negative evidence, that lead poisoning is unknown among adults—other than those exposed to certain occupations, painters, compositors, &c.—in Brisbane. If this is the case, the affection of children only must be sought in some source to which they are peculiarly liable. Such a source was suggested to us by Miss Gillett, the matron of the Children's Hospital, in the tinfoil which is so commonly used to wrap up the sweetmeats that children delight in chewing unpeeled. In one of our cases the mother particularly stated that the child was accustomed to these luxuries. The school-boy mentioned earlier in this paper was in the habit of chewing tinfoil into pellets, with which to pelt his school-fellows, who also did the same. To ascertain the possibility of this as a cause we have tested twelve specimens of tinfoil used in wrapping sweetmeats. Nine of these contained no lead, the remaining three contained lead in large quantities. Two specimens of the tinfoil used in wrapping round cigarettes were also tested, and found to consist largely of lead. We do not think the evidence is sufficient to justify the conclusion that all our cases received the poison into the system from this source; and we have not at present any other clue to bring forward, though the matter is still being investigated. We hope, however, that by this paper we may attract more attention to these cases, and that those especially who have the opportunity of observing them in family practice, may discover conclusively their origin. The importance of so doing, to prevent future disease, is obvious. The literature of lead poisoning shows that the sources of contamination of food or water are very numerous, and that individuals show wide differences in their susceptibility to harm from such contamination.

A Case of Progressive Muscular Atrophy, with Unusual Cord Lesions.

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FOR the opportunity of reporting this case I am indebted to the courtesy of the Health Department, of Sydney, who not only supplied me with material for pathological examination, but also permitted me to make free use of papers detailing the following clinical history of the patient.

W.A., æt. 56 years.—Male; unmarried; a West Indian Negro; cook, and sometimes fisherman.

Previous Illnesses.—Says he had fever and ague. Many years ago he burned his right forearm. In 1864 he had what he calls a "whitlow" on the third finger of his right hand, for which he consulted a doctor, who sliced off the third phalanx, leaving a conical, atrophied stump. When occupying a wet camp in 1870 he had an attack of rheumatism. Says he never had syphilis. No other illnesses.

Mode of Origin and Course of Disease.—During the month of May, 1889, he was seen by a medical man, who stated he was then quite well. After that date, when riding through flooded country, he lost his horse and had to walk for many days in water, or over wet ground. States that he remained quite well until July, 1889, when he first noticed numbness of the fingers, and clumsiness in washing dishes, &c., gradually getting worse. On the 22nd October of the same year he came under medical treatment, suffering from cramps in the fingers and stomach, shooting pains in the limbs, and feeling of coldness in the legs and hands. In February, 1890, he is described as being well nourished, but he had some stiffness of the left shoulder-joint: his fingers were flexed on the palms, the finger joints stiff, the pulps of the fingers wasted, the nails incurved and thickened. There was numbness on the palmar aspect of the fingers, and he complained of his hands feeling dead. The left hand was worse than the right. The skin was moist and clammy. The patellar tendon reflexes were exaggerated. On the extensor surfaces of the knees the skin was thickened and scaly. There was impaired sensation over the plantar surfaces of the toes, and the toe-nails were thickened and incurved. His legs were stiff, so as to prevent his walking; this latter having come on a few months after the hands were affected. His appetite was good, but he suffered from constipation. There was no bladder trouble, the urine being normal. There were no bed-sores. In March, 1890, it is noted that his hands were more useless, but his legs had got much better under the use of the battery. He was now able to walk, though with rigid gait. Towards the end of April of the same year there was very little movement of the chest walls on deep inspiration. Both shoulder-joints were stiff, the left more so than the right. Slight wasting of the muscles of the forearms was observed, and the thenar and hypo-thenar eminences were much reduced. He suffered from frequent cramps. There was rigidity of joints on attempting to move, although he could walk fairly

well at times. On May 30th the report states that he fed himself with his right hand only, being unable to use his knife and fork. He could not hold anything except he saw it. The phalangeal joints were apparently much swollen. During the month of June he complained of spasms of the muscles of the chest and legs keeping him awake at night, allowing him only short intervals of sleep towards the morning. The spasms of the legs were more continuous in July. There was no apparent wasting of the muscles of the legs, but there was slight œdema. Fibrillary tremors seen in the adductor muscles of the thigh. The upper extremities were in much the same condition as before. In September he had marked paresis of the extensor muscles of the wrists, giving rise to wrist-drop, and he had very little use of his hands. Complained of pains in all the joints of his body. His left knee-joint seemed enlarged. Still complained of cramps in the legs coming on just as he was falling off to sleep. The left leg and arm were more affected than the right. The muscles of his thumbs were atrophied; the fingers of both hands were flexed on the palms, the left hand worse than the right. The middle finger of the left hand had the first and second phalanges flexed, whilst the third was extended. The nails of the fingers were long and incurved. Between the nails and the pulp of the fingers were ovoid patches, paler in colour than the pulp, and bounded by depressed lines. The muscles of the shoulders and back were wasted. Tendon reflexes exaggerated. The skin over the anterior surfaces of his legs was covered by a scaly eruption from the feet up to the thighs, but more noticeable below the knees. The toe-nails were much incurved, more so than the nails of his fingers. There were the same ovoid patches as on the fingers, but the depressed lines surrounding them were not so noticeable. The soles of his feet were covered by thick, large scales. There was no satisfactory evidence of anæsthesia, although there was delay in perceiving impressions. The cramps were generally more diffused, and he complained of a frequent feeling of tension over the stomach. Appetite was fairly good, but there was persistent constipation. There was no evidence of bulbar paralysis, nor were there any bed-sores. His condition gradually getting worse, at last diarrhœa set in, and he died towards the end of December, 1890. The *post mortem* records state that the body generally was much emaciated, the cutis leathery, thickened, and shrivelled all over the body. The liver was healthy, the kidneys pale and bloodless. The lungs were adherent to the pleura, the left lung being heavily charged with tubercle in small masses. The glands in the neck and mesentery were much enlarged, and the muscles generally much atrophied. The dorsal spinal veins were congested and bled very freely. The arachnoid fluid was said to be excessive.

Condition of the Spinal Cord.—Unfortunately, none of the cervical part of the cord was available for examination; consequently, the following description applies only to the parts from the upper dorsal downwards.

1. *Changes in the Membranes of the Cord.*—All the membranes were thickened and congested. The pia-mater, in some places, was markedly thickened, and its blood-vessels full of blood. This condition extended all round the cord in some localities. In other regions the change was not so well marked.

2. *Changes Affecting the Grey Matter of the Cord.*—The most important change was to be found in the multipolar nerve cells in the anterior cornua. Speaking generally, these were affected, in varying degrees, from the upper dorsal region—the highest point examined—to the “conus medullaris.” The change consisted in a pigmentary degeneration of these cells, the granules

of pigment being very minute, of a golden-yellow colour by transmitted light, with a clear centre and dark margin when carefully focussed. In the "conus medullaris" only a few of the multipolar nerve cells were pigmented, and very few were atrophied. Here the change was in its earliest stage. In the lower lumbar region more cells were undergoing the pigmentary change, accompanied by atrophy of several of the affected cells. Higher up the lumbar region a very considerable number of the cells were diseased, some being almost completely transformed into masses of pigment. Then, in the upper lumbar and lower dorsal regions the cells were comparatively few in number in some sections, and almost every one was pigmented, and more or less atrophied. In this locality some of the cells in "Clarke's columns" were also pigmented. To a greater or less extent these changes were seen in the whole of the dorsal portion of the cord. (Figs. VIII and V.) The blood-vessels in the grey matter seemed more numerous than normal, and their walls were thickened. Around many of them were abnormally dilated perivascular sheaths. There was no indication of active inflammatory change in any part of the grey matter.

3. *Changes Affecting the White Matter.* — Tracing these from below upwards we find that in the lower part of the conus medullaris the white matter is quite healthy, except a very slight degeneration affecting the outer and posterior parts of the lateral column, more marked on the left side. (Fig. I.) Higher up, the left lateral pyramidal tract was degenerated, and a zone of degeneration extended forwards around the margin of the left side of the cord almost up to the anterior median fissure. There was likewise a slight marginal degeneration of the lateral column on the right side, occupying the antero-lateral part of the column. (Fig. II.) Both lateral pyramidal tracts were degenerated in the lumbar region, the left more than the right. The marginal degeneration extended all round the cord. (Fig. III.) Fig. IV represents the condition of the cord in the upper lumbar and lower dorsal regions. The lateral pyramidal tracts are degenerated on both sides, the left more so than the right. There is a marginal degeneration extending forwards on both sides quite up to the anterior median fissure, and backwards to the posterior median septum, the anterior involving more of the substance of the cord than the posterior. Throughout the whole of the dorsal portion of the cord there was marked degeneration of the lateral pyramidal tracts; but, in addition, the annular marginal degeneration was very pronounced, involving, as it did, the greater part of the anterior and antero-lateral columns, but only a comparatively narrow strip along the periphery of the posterior column.

The Degeneration of the Lateral Pyramidal Tracts was of the ordinary character, consisting in an increase of the neuroglia, with degeneration and disappearance of the nerve fibres in the affected areas. It is well to note that, apart from the marginal degeneration already described, there was not observed any distinctive degeneration of the areas of the cord usually occupied by the anterior or direct pyramidal fibres.

The Annular or Marginal Degeneration differed in appearance from that affecting the lateral pyramidal tracts, and appeared to have originated subsequently to it. It had a more open structure, and contained many clear open spaces. There were more nerve fibres present, many of which were considerably swollen, and there was less neuroglia. This annular degeneration evidently resulted from the presence of the chronic leptomeningitis already described. Many of the blood-vessels in the fibrous septa were congested, but there was no evidence of small cell proliferation.

To illustrate Dr. Gibson's paper on case of Progressive Muscular Atrophy.



Fig. I.

X 20.

H

Transverse section of the Spinal Cord; near lower extremity of Conus Medullaris.

- a m. Anterior median fissure.
- p m. Posterior median Septum.
- a Area of degeneration on left side.
- b. Area of degeneration on right side.
- c. Pia mater thickened and vascular.

12.12.93

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SCALE, 5/9 OF ORIGINAL DRAWING

To illustrate Dr. Gibson's paper on case of Progressive Muscular Atrophy.



Fig. II.

X 20.

Section of cord higher up the Conus Medullaris.

- a.m. Anterior median fissure.
- p.m. Posterior median Septum.
- a. Area of degeneration on left side.
- b. Area of degeneration on right side.
- c. Pia mater thickened and congested.
- d. Anterior nerve roots degenerated.
- e. Posterior nerve roots degenerated.

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Fig. III.

X 20.

Section of Cord - lumbar enlargement.

- a.m. Anterior median fissure.
- p.m. Posterior median septum.
- a. Area of degeneration on left side extending forward to a.m.
- b. Area of degeneration on right side extending forward to a.m.
- c. Pia mater thickened and congested in places.
- d. Anterior nerve roots markedly degenerated.
- e, e. Area of degeneration posterior columns.
- f, f. Bloodvessels with thickened walls and dilated perivascular sheaths.
- g. Central canal more cellular than normal.

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Fig. IV.

X 80.

Section of cord - lower dorsal region.

- a. m. Anterior median fissure.
- p. m. Posterior median septum.
- a. Left lateral pyramidal tract markedly degenerated.
- b. Right lateral pyramidal tract is markedly degenerated.
- c. Marginal degeneration involving the greater part of both antero lateral columns, and forming a comparatively narrow strip along the margin of both posterior columns.
- d. Pia mater thickened in places.
- e. Central canal more cellular than normal.
- f. Clarke's columns - many of the cells in which were pigmented.

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SCALE, 5/9 OF ORIGINAL DRAWING

To illustrate Dr. Gibson's paper on case of Progressive Muscular Atrophy.

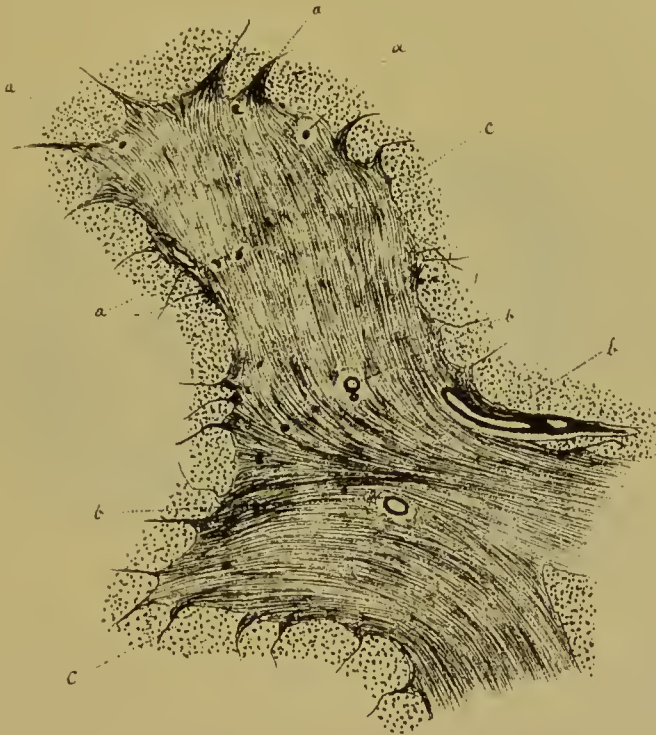


Fig. V.

X 50.

Left anterior horn. Dorsal region.

- a. Atrophied multipolar nerve cells surrounded by clear spaces.
- b. Blood vessels with thickened walls, and dilated perivascular sheaths.
- c. White matter of cord.

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SCALE, 5/9 OF ORIGINAL DRAWING

To illustrate Dr. Gibson's paper on case of Progressive Muscular Atrophy.

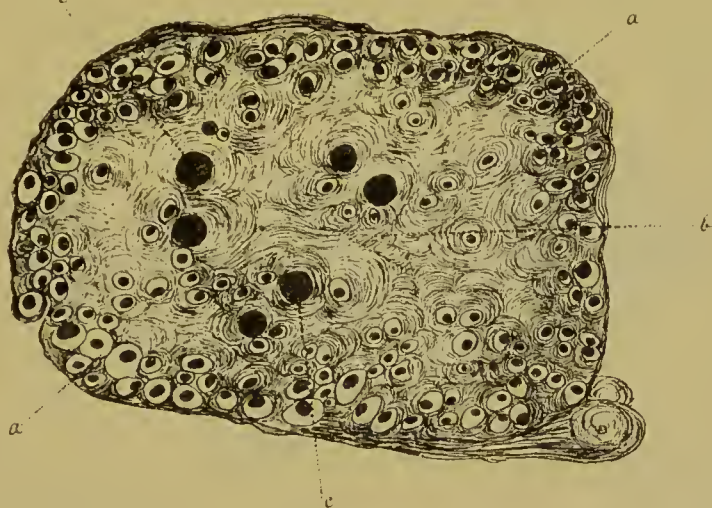


Fig VII.

X 350.

fasciculus -
Degenerated anterior nerve root - Lumbar region.

a. Nerve fibres, some of which are healthy - others thickened, with swollen axis cylinders.

b. Degenerated area in which there are only a few nerve fibres, and

c. Hyaline or colloid bodies.

Compare with Fig. VII.

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SCALE, 5/9 OF ORIGINAL DRAWING

To illustrate Dr Gibson's paper on case of Progressive Muscular Atrophy.

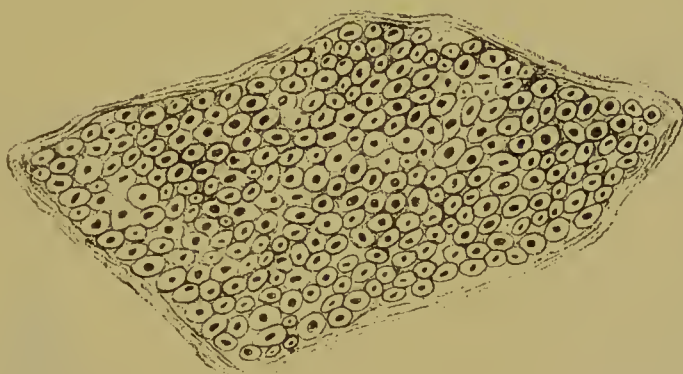


Fig VII

X 350.

fasciculus -
Healthy anterior nerve root.

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Compare with Fig. VI.

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SCALE, 5/9 OF ORIGINAL DRAWING.



x 325

FIG. VIII.

DEGENERATED MULTIPOLAR NERVE CELLS. WEIGERT'S STAIN.

- a. . From anterior horn-lumbar region. Cell not atrophied, but with a pigmentary change partly surrounding the nucleus.
- b. Cell from same region as foregoing, showing some degree of atrophy. Pigmentary change more advanced, involving greater portion of cell, and obliterating nucleus.
- c. Cell from dorsal region, showing more marked atrophy and pigmentary degeneration.
- d. Cell from dorsal region, showing advanced stage of atrophy and pigmentary degeneration.

Throughout the whole of the degenerated portions, both in the spinal cord and nerve roots, numerous "hyaline" bodies were seen. (Fig. VI.) The central canal, in all the sections examined, was obliterated, and its place occupied by numbers of cells, apparently the result of proliferation of the epithelial cells lining the canal.

Changes in the Nerve Roots.—In proportion to the extent of the diseased condition of the multipolar nerve cells in the anterior cornua were the fasciculi of the anterior nerve roots affected. Fig. VI is a camera lucida drawing of a diseased fasciculus from an anterior nerve root in the lower lumbar region. It shows accurately the amount of destruction of nerve fibres and increase of fibrous tissue, and may be compared with Fig. VII which represents a normal fasciculus. There was likewise a certain amount of degeneration of the fibres of some of the posterior nerve roots, which degeneration closely resembled the annular or marginal degeneration previously described as affecting the spinal cord itself.

Condition of the Peripheral Nerves.—Portions from the median and ulnar nerves of both arms were available for examination. Sections of these nerves showed less degeneration than one would have anticipated. Only one or two fasciculi appeared atrophied in transverse sections. There was a slight increase in the connective tissue between the fibres in some of the other fasciculi more apparent in the carmine and picro-carmine stained sections. In both median nerves, but especially the left, the nerve fibres in some of the fasciculi were widely separated from their peri-neurium along a considerable part of the circumference of the fasciculus, by what, under a low power, appeared a clear space, but which, under a high power, seemed to be a peculiar gelatinous degeneration of the endo-neurium. This change was also present, in a milder form, in sections of both sciatic nerves in which there was, in addition, atrophy of some of the bundles of nerve fibres with increased connective tissue between the nerve fibres in others.

Changes in the Muscles.—Fortunately, a very small piece of muscle was adherent to the left ulnar nerve, and an examination of it revealed:—

- 1st. Atrophy of many of the muscle fibres.
- 2nd. Hyaline, or Zenker's degeneration of a few fibres; the fibres becoming swollen, glassy-looking, and losing their striæ.
- 3rd. Loss of transverse striation and presence of fine longitudinal striation, the fibres splitting up into numbers of fine fibrillæ.

No fatty degeneration of muscle fibres was observed. This case appears to me to be of some interest:—

- 1st. On account of its unusually rapid course, death occurring one year and six months from the commencement of the disease.
- 2nd. Because of the complication in the symptoms.
- 3rd. From the presence of tubercular disease of the lungs.
- 4th. Because of the complicated cord lesions; the ordinary lesions of progressive muscular atrophy having superadded to them, those of sub-acute or chronic meningitis, along with the annular or marginal degeneration, resulting from the latter.
- 5th. On account of the peculiar condition of the skin of the fingers and toes, and the scaly eruption over the legs, which seemed to have some relation to the progress of the cord lesion.

P.S.—I wish to express my best thanks to Miss Isabel D. Hawks for the faithful manner in which she has executed the drawings illustrating this paper. J.G.

Spinal Irritation.

A. JARVIE HOOD, M.B. (GLAS.)

THE name Spinal Irritation is subject to so many interpretations, and the disease is so varied in its symptoms, occurrence, etiology, and pathology, that I doubt not that the majority of you are astonished at my seeming temerity in choosing such a subject for a short paper; but my object is mainly to introduce a discussion on a form of disease which appears to me to be one of our most prevalent forms of nervous ailments. I purpose ~~to~~

1. To give you a short sketch of its history in medicine as a separate form of disease;
2. To try and define its present position as regards occurrence, etiology, and treatment; and
3. To give a few illustrative cases.

HISTORY.

Although certain groups of symptoms referable to irritation of the spinal nerves had been discussed by many physicians since the close of last century, it was not till 1828 that the name Spinal Irritation was applied to them as a special form of disease. This name was given by Dr. Thomas Brown, of Glasgow. Dr. Brown published numerous illustrative cases.

Dr. Jarvie Hood then proceeded to note that, while since that time numerous writers—French, American, German, and English—have published treatises on the same subject, little or no light has been thrown on the pathology of it, and some authors distinctly deny the existence of irritation in the spinal column, going so far as to call the symptoms purely hysterical, while others again ascribe the pain to simple intercostal neuralgia. Inman, in 1860, grouped the symptoms under the name of *myalgia*. No mention of spinal irritation is made in the “Nomenclature of Diseases,” published in 1869. In the “Quarterly Journal of Science,” J. R. Player drew attention to the existence of spinal irritation. Dr. Brown distinctly describes two kinds of spinal irritation: the first is a very slight form which is amenable to treatment in the early stages, but when neglected produces nervous complaints and general ill health; the second form he describes as of a much more severe nature, and, instead of being strictly local, is associated with more peripheral and distressing symptoms. This form is very obstinate to treat, and is peculiar to females. He also points out that spinal irritation must not be confounded with other spinal affections. The symptom which he regards as being the most constant is pain below the left breast, of a gnawing, bruised nature, attended with great restlessness, increased by fatigue, and invariably relieved by rest in a horizontal position. Not associated with tenderness on pressure over the seat of pain, the pain was greatly increased by pressure about the 7th or 8th dorsal vertebra, and pressure over that spot excited more or less tenderness or sickness. His cases all yielded to the same form of treatment, viz., leeches or a blister to the painful part, absolute rest in a horizontal posture, and attention to the general

health. He considered that the immediate cause of pain was spasm of one or other of the muscles ranged along the spine altering the position of the vertebrae or compressing the nerves as they issue from the spinal marrow; and that this spasm in many instances was strictly a local disease, produced by fatigue, wrong posture, or other cause, and quite unconnected with the state of the brain, spinal marrow, or nervous system in general. He also admits, however, that in certain severe cases, added to these causes there may be a faulty condition of the vessels of the brain or spinal marrow, this faulty condition in its turn giving rise to spasm of certain groups of muscles, convulsions, or other serious eccentric symptoms. He particularly drew attention to the fact that in those cases where the tenderness of the spine was local, this local tenderness always occupied that part of the spine where the greatest movement obtained, and where of course the muscles were most liable to deranged action or spasm. Dr. Brown's treatise was shortly followed by one by Mr. Teal, who to some extent agreed with Dr. Brown. Then, in 1835, the brothers Griffen contributed a valuable monograph on the subject, in which they pointed out that spinal irritation is never inflammatory, but always associated with functional disorders and spinal tenderness, including disorders of the uterus, stomach, bowels and upper extremities, but seldom the bladder or lower extremities. They pointed out, too, that spinal irritation might be the result also of those functional disorders. They stated that spinal irritation was seldom if ever fatal. Subsequently, articles were published by Austin Flint, Axenfeld, Radcliffe, Hammond, and Leyden. In 1881, Ross says: "It is probably a functional disorder of the cord due to alternating conditions of hyperæmia and anæmia." Erb claims for it as distinct a place in our nosology as we accord to tetanus, epilepsy, hysterical paralysis, and other diseases of the pathological anatomy of which we are ignorant. Dr. Hammond, of New York, regards it as a condition of anæmia of the cord. Notwithstanding this evidence there are many who refuse to believe that it is entitled to a separate place in our nosology. The majority of these unbelievers prefer to include the symptoms either under the head of neurasthenia or nerve exhaustion, or associate it with the protean symptoms of hysteria.

PRESENT POSITION OF SPINAL IRRITATION AS REGARDS ETIOLOGY, SYMPTOMS, AND TREATMENT.

Dr. Jarvie Hood stated that the term spinal irritation is applied to a functional derangement of the spinal column or spinal nerves, met with generally in young adults, principally females, most usually between the ages of 15 and 30, characterised by pain and tenderness in some part of the spinal column, and associated with various eccentric symptoms.

(A) *Etiology.*

Under this head Dr. Jarvie Hood went on to say, as to age as a factor in causation, most cases occur between the ages of 16 and 25. Speaking generally, about 90 per cent. of the cases occur between the ages of 15 and 35. As to sex, the great majority of cases occur in females. In 1,000 cases of Hammond's 852 happened in females. In 50 cases of Brown-Séquard only three were men. In 148 of M'Call Anderson's 26 only were men. As to heredity its influence is undecided. Hammond reports one case where a mother and three of her daughters were all affected with it at the same time; but this is rare. M'Call Anderson regards it as decidedly hereditary. As regards exciting causes, the principal are: a blow, grief, sudden fear,

passion, long continued violent exertion, strains, and anything that depresses the general condition, especially of neurotic patients, such as exhausting diseases, hard mental application, insufficient or unsuitable food, intemperance in alcoholic liquors, and in the use of tobacco.

(B) *Symptoms.*

These may be divided into two classes, viz., *Central* and *Eccentric or Peripheral*.

The *Central*, or local symptoms, are manifested at or near the part of the spine affected.

The *Peripheral* symptoms are exhibited at any distance from the spine, and consist of reflex or direct manifestation of irritation of the spinal nerves.

Central.

1. *Spinal Tenderness*.—This varies greatly in intensity and position. It sometimes has to be sought for by the physician. It may be localised to one vertebra, or exist in different parts. Its most frequent seat is about the eighth or ninth dorsal vertebra, and next in frequency is the region of the cervical vertebræ. The spinous process of the vertebra is generally the spot of greatest tenderness, but it may be found over the transverse process. The muscles on either side of the spine may be tender. There may be peripheral tenderness, most frequently under the left breast, in the throat, and sometimes in the viscera.

2. *Spontaneous Spinal Pain*.—Not so valuable a symptom, as it exists in other diseases. It varies from a feeling of heaviness or aching to a feeling of heat, cold, itching, stabbing, or even throbbing. Rest generally lessens it; movement increases it, as may also the application of galvanism. Mental disturbance may excite it.

Eccentric or Peripheral.

These symptoms vary with the part of the spine affected. When in the cervical region we may have vertigo, or, more often, intense vertical headache, also affections of sight, taste and smell, tenderness of scalp, noises in the ear, emotional disturbances, melancholia, hallucinations, insomnia, somnambulism, pain in shoulder, arms or neck, spasmodic cough, and spasmodic dysphagia. When the dorsal region is affected the symptoms are generally severe, including disorder of stomach and heart (such as irregularity and occasionally fainting attacks), and pleurodynia. When the lumbar region is affected the muscles of abdomen, back and legs, are often the seat of great pain, and there may be disorders of the bladder, bowels, and sexual apparatus. When the cervical, or the lumbar region is affected we may have tonic or clonic muscular spasms. Other symptoms are paralytic convulsions, paralysis, trembling or fibrillary twitchings, alterations in the secretions, in nutrition, great weakness, constipation, and flushings of the face. The intestinal digestive system appears largely to escape.

DIAGNOSIS.

Under this head, Dr. Jarvie Hood noted that uncomplicated spinal irritation is generally diagnosed without difficulty. The principal diseases with which it must not be confounded are tetany, tetanus, spinal meningitis, con-

gestion of the spinal cord, hysteria, myelitis, and organic diseases of the vertebrae. *He then dealt with the question of differential diagnosis, quoting McCall Anderson's aids to diagnosis, viz.:*—

1. That the pain or disorder of any particular organ is out of proportion to any constitutional disturbance.
2. Pain is usually relieved by recumbent position and aggravated by motion.
3. Tenderness of that part of spine corresponding to peripheral symptoms, and aggravation of those symptoms by pressure over the spinal cord at that point.
4. The disposition to change of pain from one organ to another, and occurrence of hysterical symptoms.
5. Continued occurrence of fits of yawning and sneezing.

PROGNOSIS.

Prognosis generally favourable, guarded in those in which the disease has lasted long, and in cases of relapse. Never fatal, but in severe cases intercurrent disease may prove serious. A certain percentage of cases improve under treatment for a while, but relapse into their old condition, and these patients generally degenerate into hopeless invalids.

TREATMENT.

The majority of writers are at one as regards treatment. Dr. Brown in 1828, discovered that rest in a recumbent posture, even with no other treatment, afforded great relief. Counter irritation in the form of a fly blister, iodine, sinapisms, and the light application of the actual cautery are highly beneficial. To meet the associated anæmia and debility, some form of analeptic or nervine tonic is constantly prescribed, *e.g.*, iron, quinine, arsenic or nux vomica, and Dr. Hammond lays stress on the good results he has had from zinc, but his opinion remains unconfirmed. Brown-Séquard recommends the hypodermic use of morphia, strychnine and atropia combined, and the local application of an ointment containing aconite and veratria. Among other remedies recommended are nitro-glycerine (in increasing doses), mineral acids, ice poultices (to spine), galvanism, and massage to spine and limbs. McCall Anderson advises the free use of stimulants, but this form of treatment is not advocated by many authorities.

Attention to patient's diet, fresh air, cheerful companions, avoidance of all excitement and mental worry, and in many cases complete rest with the relief of symptoms, lead to absolute cures. To sum up, the treatment must have attention in the following particulars:—Removing, if possible, the cause of the condition; attending to the general condition of the patient and the improvement of his health, with special reference to the digestion, and the improvement of the state of the blood, and to set up some form of counter irritation at or near the affected part of the spinal cord.

ILLUSTRATIVE CASES.

During the last eight years I have kept notes of twenty-nine cases of spinal irritation, of whom two were male and twenty-seven female. Of the former, one was aged 54 and the other 17; while of the latter, three were under 17 years of age, four over 30, and the remaining twenty varied in ages between 17 and 30. Of the twenty-nine cases, six were cervical, fifteen dorsal, five dorsal and cervical, two lumbar, and in one there was tenderness of the whole spine. Speaking generally, the plan of treatment in all cases was practically the same, *viz.*, the removal of all exciting causes,

of whatever nature, attention to the general hygienic condition, including food, clothing, fresh air, and cheerful surroundings; absolute rest in bed (this point I insisted on specially, patients not being allowed to sit up, but kept lying perfectly flat on a hair mattress, feather and wool beds being forbidden). Iron, arsenic, nux vomica and strychnine were also given according to requirements. Complete recovery resulted in twenty cases; improvement was very marked in five; and of the remaining four, temporary relief has been repeatedly afforded, but they have been time after time subject to relapses. The following are notes of a few of the most interesting of the cases:—

Case 1.—Female, married, aged 34. This patient who had at one time been in very good circumstances, had through reverses lately been compelled to earn her own living. Never very strong, but had never had any serious illnesses. For twelve months had been working almost night and day perhaps only going to bed for three or four hours out of the twenty-four, and then began to suffer from vertical headache, vomiting, aching pains in her back and limbs, complete loss of appetite (but stated that instead of losing flesh she was gaining it), an abiding pain below the left breast, and attacks of dyspnoea. Family history bad: one brother died insane, and another brother in an asylum suffering from melancholia, a third also melancholic. I found no disease of heart, lungs or other viscera; the tongue was large and flabby, but fairly clean. A large area of tenderness extended from the 8th to the 12th dorsal vertebræ. The tenderness was extreme, and pressure increased the pain under the left breast to a marked degree, and caused a feeling of discomfort or even pain in the abdomen. Pressure also over the spot mentioned induced almost instant vomiting. The treatment adopted was absolute rest in bed, a fly blister over the area of spinal tenderness, and general tonic treatment, large doses of nux vomica being given. She rapidly improved under this, and in about two months was in excellent health. Six months after this she had a relapse of a more severe nature. To the former symptoms were added complete amenorrhœa, dysuria, pain down the sciatic nerves and in the loins; constipation, and absolute insomnia. There were now three distinct areas of spinal tenderness, one over the 6th and 7th cervical, another at the level of the 8th and 9th dorsal, and a third over the lumbar vertebræ. Complete retention of urine set in, and for over two months a catheter had to be used constantly. Treatment as before was adopted, but it was at least six months before she regained anything like good health. Since then—now six years ago—she has had two relapses, both similar to the first, and neither being so severe as the second. At present she is in very fair health, her only trouble being sudden attacks of faintness with vertigo.

Case 2.—Female, aged 24, suffering from intense and constant headache (of over eighteen months' duration), sleeplessness, loss of appetite, aching pain between the shoulders, and severe pain under both breasts. A highly nervous young woman and of a very neurotic family. Heart sounds normal, but very weak, and she was very anæmic. Occasional vomiting. Tongue pale, flabby, and slightly coated; pulse soft and very rapid. No rise in temperature. Tenderness existed over the region of the third, fourth, and fifth dorsal; this extended on either side of the spine for about a couple of inches; was very marked, slight pressure causing a good deal of agony, and accentuating to a marked degree the pain under both breasts. The treatment adopted was absolute rest in bed, counter irritation by a light application of the actual cautery. Weir Mitchell's treatment for neurasthenia, with seclusion, diet-

ing, massage and galvanism, was, as far as possible, carried out. Extremes of constipation was a prominent symptom, giving at first a good deal of trouble. In two months' time she was absolutely well, and since then—four years ago—has never been laid up, only occasionally being troubled with slight vertical headaches, which appear generally before the catamenia.

Case 3.—Female, aged 36. This case was very similar to No. 2, save that the headache was not so intense, or so constant; there was pain under the left breast only, aching between the shoulders, weariness, great depression, and anorexia. Never very robust, but had never suffered from any severe illness. Present illness began a few months previously, and latterly she had been feeling as if she could hardly exist from pure weariness, pain, and general discomfort. There was well-marked spinal tenderness at the region of the eighth, ninth, and tenth dorsal vertebrae, and the whole spine was hypersensitive. In this case the treatment adopted was, as usual, rest in a horizontal position, fly blisters and iron tonic, regulation of diet, massage and electricity, and also seclusion, with two well-trained nurses. My reason for subjecting this and the previous patient to seclusion was because they both belonged to very emotional families, whose sympathetic attentions militated very much against their recovery. A good recovery was made, and since then—2½ years ago—she has enjoyed excellent health.

Case 4.—Male, aged 56. An apparently strong, well-built man. Consulted me about a constant pain he had about the level of the second or third lumbar vertebra. This pain had come on about three months previously, but only intermittently, with perhaps intervals of days between the attacks. Within the last three or four weeks, however, it had been constant, and accompanied by pain down the thighs, in both groins, and also in the abdomen. He had great difficulty in stooping, turning in bed, in lifting any weight, and performing any movement necessitating action of the spinal column. For some time his business duties had been extremely responsible, and associated with a good deal of mental anxiety and strain, so much so that they had interfered with his sleeping and eating to a serious degree. No history of any accident, injury, exposure of any kind, or indiscretion in diet. Naturally he was a very cheerful man, but had lately been very low-spirited and emotional, stating that he even felt inclined to cry without any cause, a feeling quite foreign to his nature. On examination of the spine a distinct tender area was found, existing from the level of the last dorsal to the third lumbar vertebra, and for some distance on either side of the spine. No sign of disease of the heart, lungs, or other viscera; sight and hearing were perfectly good, no loss of power, and no change in sensation excepting the spinal tenderness. Tongue pale and slightly furred. He declined to lay up, and, for the purpose of keeping the spinal column as free from movement as possible, a light leather apparatus was applied. He, however, got worse, and was at last forced to take to bed, and then the usual treatment—counter irritation, &c.—was begun. Three days after taking to bed acute catarrhal jaundice appeared, necessitating a slight change in the treatment; but the two principal parts—rest and counter irritation—were not interfered with. He rapidly improved, and in six weeks' time left for England for a trip, free of pain, and in good general health, with all symptoms of jaundice almost gone. On arrival in England there was a slight recurrence of the spinal pain, and he was seen by Mr. Victor Horsley, who agreed as to the former diagnosis, immediately ordered him off to bed, and adopted in this case a modified Weir Mitchell treatment. He rapidly recovered, and since then—twelve months ago—has had no return of any symptom of the kind.

Diabetes, with a Case of Recovery from Coma by the Administration of Oxygen Gas.

LEONARD W. BICKLE, L.R.C.P. LOND., M.R.C.S. ENG.

In diabetes we have, similarly to Albuminuria, the interesting point yet to solve as to where the physiological process ends and the morbid one begins. The term "Functional Albuminuria" is now well known, and by it we understand that the presence of albumen in the urine, formerly considered conclusive evidence of Bright's Disease, may yet occur at times where none of the grosser lesions of kidney disease manifest themselves, and the health, apart from the mere presence in the urine of this constituent, is perfect. Whether further observations will prove this sign to be the earliest danger signal of the gravest of kidney lesions, time alone will prove. Similarly with diabetes the presence of sugar in the urine was considered pathognomonic, but now we have come to recognise transient glycosuria, and authorities such as Pavy, Bernard, and Germain Sée state that sugar is always a normal constituent of human urine, and Dujardin Beaumetz distinguishes between glycosuria, which he terms a symptom, and diabetes, which he terms a disease, and which he divides into three forms, one slight and benign, one slow and moderate, and a third grave. The presence of sugar in the urine of elderly people (glycosuria) may be readily overlooked, whilst it may cause very troublesome symptoms, easily amenable to treatment; on the other hand, true diabetes is also to be found in the old as well as in the young.

PATHOLOGY.

The chief views still appear to be between those of the Bernard school, who regard the liver as a sugar-producing organ, and the followers of Pavy, who regard it as a sugar-assimilating organ. Germain Sée says that "normal urine contains sugar, Phenylhydrazin, the most delicate test for sugar showing 33 mm in 100 gms. of urine in 17 per cent. of healthy individuals. These people are not diabetic if 160 gms. of white bread do not vary the amount; in other words, 250 gms. of grape sugar must be swallowed to be eliminated. With diabetes the smallest quantity is detected and increases the existing pathological amount. There may be normal glycosuria by simple exaggeration of the ordinary phenomena of life, on condition the sugar is introduced, and the glycogen of liver and muscular tissue has not undergone any modification. Glucose is formed naturally in the economy (1) by the modification of amylo-saccharine substances in the food, (2) by the transformation of glycogen, (3) at the expense of the albuminates from without and within. There is but one step from normal glycosuria to permanent diabetes; this occurs when the circulation of the liver is altered by irritation, from the cord or other nervous centres, of its nervous system. This increased activity exaggerates the genesis of glycogen and the rapid and excessive transformation into sugar. Diabetes is the result of hyperglycosuria, usually of nervous origin. The nervous system must be treated, and benefit may follow."

Professor Seager's experiments on animals ("British Medical Journal," 1888, vol. i) lead him to conclude that the formation of sugar in the liver is a normal constant process.

Pavy says "the amount of sugar in the urine and the blood is about equal, and that the sugar in the blood increases in direct ratio to the amount in the urine." The remembrance of this fact will help in the treatment of coma. Mons. Lépine says that experiments have shown that the transformation of glycogen into glucose is a very gradual process, and requires the aid of the pancreatic ferment. If this is wanting, the hepatic sugar becomes foreign to the economy, and is eliminated by the kidneys. It is now well recognized that destruction and disease of the pancreas may cause diabetes.

DISTRIBUTION.

It is more prevalent in cold elevated parts, where the rainfall is great. Dickenson says that in England it is more prevalent in the colder counties. In America it is also the same, 3.98 deaths per 1,000 in N.E. hilly parts to .76 per 1,000 deaths in S. Atlantic Coast region.*

In South Australia, 68 deaths (M. 41, F. 27) have been registered from 1882-91. The total number of deaths in same period was 41,176, being about 1 in 605 deaths. (In 1882, 1883, and 1884, 1 death in 1,300 about; in 1889, 1890, and 1891, 1 in 330 about; a curious increase.)

In Victoria, for 5 years, 1886-90, there were 154 deaths (M 98, F. 56), or about 1 in 540 deaths from all causes; 71 in Melbourne, or 1 in 622, and 83 in the rest of Victoria, or 1 in 487. The rural death-rate in Victoria is in excess of the city, as in America,* where in twelve large cities it is 1.46 per 1,000 and 2.46 in country. This is curious in the light of the view that diabetes is increasing as a result of the high-pressure mode of life of to-day; one would naturally expect the reverse. In the United States the death-rate per 100,000 has risen from 98 to 191 in the periods 1850-60 and 1870-80.

DETECTION.

Professor Haines has brought forward a test for sugar having so many advantages over Trommer's and Fehling's tests that I reproduce the formula here:—

R.—Cupri. sulph. pur..... 3 ss.
Aque pure..... 3 ss.

Make a perfect solution.

Then add glycerine, 3 ss., mix well and add liq. potassæ, 5 v. Fluid is clear, transparent, dark blue in colour, and perfectly stable. In using, 5 j. of test is poured into a tube and gently boiled, 6 or 8 drops of the suspected urine are added, and the solution is again heated, when sugar, if present, is at once shown by a brick red precipitate.

For the rapid quantitative testing for sugar, Purdy gives a simple formula, which in almost the same form has been independently suggested by Dr. Pavy.

R.—Cupri. sulph. pur..... 3 ss.
Potassæ causticæ pur..... 3 iiss.
Liq. ammon. fort. 5 vss.
Glycerin..... fl. 3 vi.
Aq dest..... ad. Oi.

* See elaborate tables in Purdy's monograph on diabetes. Physicians' ready reference series.

Dissolve cupr. sulph. in some of water, and then add the glycerine. Dissolve the potash in another part of water. Mix the two solutions, add the ammonia, and make up to 1 pint with water, filter if necessary. A definite quantity of the solution is reduced by boiling by a definite amount of grape sugar, completely discharging the colour and leaving a colourless solution. To use the test, dilute some of urine with an equal amount of water in a measure or test tube. Into another tube measure carefully 3 j of the test solution. Raise this to the boiling point over a spirit flame, and with a minim pipette crop in the diluted urine drop by drop till the colour is discharged. Add the first 5 drops slowly, allowing about 5 seconds between each, and gently boiling.

If colour is discharged by	Mj	the urine contains	30 grains or over per fluid ounce.
"	"	Mji	" " from 15 to 30 grains "
"	"	Miii	" " from 10 to 15 grains "
"	"	Miv	" " from 7 to 10 grains "
"	"	Mv	" " from 6 to 7 grains "
"	"	Mvi	" " from 5 to 6 grains "
"	"	Mviii	" " from 4 to 5 grains "
"	"	Mx	" " from 3 to 4 grains "
"	"	Mxv	" " from 2 to 3 grains "

One point to be remembered in using this test is that if the solution be allowed to stand it soon regains its colour by absorption of oxygen from the atmosphere.

CLINICAL CASES.

Glycosuria.

1. A man about 74, with constant micturition, no bladder or prostate trouble. Urine contained a small amount of sugar. Relieved by codeia dissolved in acid phosph. dil. Has had two subsequent attacks relieved in same way. None now for some months.
2. A feeble man of 70, with heart disease and dropsy. Chief trouble, constant micturition night and day; small amount of sugar; relieved by codeia, digitalis, and acid phosph. dil. No return of glycosuria; death 18 months later from heart disease and bronchitis; no return of excessive micturition.
3. Man aged 65, troubled with frequency of micturition only when performing his duties as secretary to a public society. Traces of sugar have been found at these times, and probably from the mental strain patient has at this time.
4. Man about 62, seen in 1890 as a candidate for life assurance. Urine contained a decided amount of sugar. Patient did not seem or feel ill in any way. He still continues in good health. He was not accepted.
5. Man about 81; remarkably fine physique. Seen for retention from enlarged prostate. Quantity of water very excessive. Small amount of sugar found. By perseverance with codeia, water gradually reduced to normal amount. Solid opium in this case had no effect over quantity of water; it had to be given for some time continuously. Water now, many months after, is normal in quantity, and free from sugar.

Diabetes Proper.

Case 1. Man about 84. First seen professionally in July, 1889, for gastric trouble. Water natural, no sugar. In November, the same year, had sugar in water; developed all signs of diabetes, and died comatose within 6 months of sugar being found.

Case 2. Lady about 77. Supposed to have had a chill; somewhat drowsy when seen; congestion of right apex. Tongue like raw beef; history of excessive micturition for some months; no great wasting; water contained much sugar; next day profound coma, ending in death the same night.

The foregoing cases are remarkable in the first place for the age of the patients, the average being 73 years. In the cases of glycosuria, in three of them the sugar reaction by Trommer's test was delayed, and it was only by chance in the first case that this was noticed, preventing the error in other cases. Another feature is the undoubted influence of codeia in these cases of glycosuria, not only for temporary, but for permanent relief; no diet restrictions were enforced. In the case of true diabetes it is, I think, rare to find it set up, and running its rapid course in a man so old as 84.

The next case has the point of interest of recovery from coma. On July 17th, 1892, saw Mrs. F—, æt. 67, who, her friends said, shortly after dinner on that day lost her memory for words, then began to wander in her mind, water dribbled from her mouth, and she became insensible. She was in bed when I saw her first, 7.30 p.m., five hours after the seizure, as I was away when sent for. She was then unconscious, temperature markedly subnormal; pulse irregular, intermittent, and feeble; breathing somewhat stertorous; pupils even; no evident paralysis; at times lying on back, and then turning on side curled up as in cerebral irritation. When roused, looked around vacantly, not recognising husband or daughters; muttered incoherently and relapsed into insensibility; no special odour of breath was remarked. On inquiry it came out she had been failing much lately, was very thirsty, and much troubled with frequency of micturition, with large quantity of urine. A little was fortunately obtainable, and showed presence of sugar—subsequently ascertained to be 15 grains to 1 ounce. Hyd. subchlor., gr. x, was put on the tongue, and sinapisms were placed on heart, and hot bottles to feet, and a mixture of morphia, ammonia, and ether given every hour. At 9.30 p.m. seen again, no improvement. The State School head-master I knew went in for chemistry, and he kindly lent me an ordinary Florence flask, some glass tubing, and a wash bottle. I connected these with drainage tubing, leading a long tube from the delivery tube of the wash bottle. $Mn.O_2$ and pot. chlor. were put in the flask, and O generated by heat. Mr. P— saw to the generation of the gas, whilst I directed the stream into mouth and nostrils. After some five minutes there were signs of returning consciousness in efforts to push away the tube. Five minutes later she opened her eyes, recognised her relatives, and spoke rationally. She was allowed to go to sleep, and awoke quite rational. The mixture was continued for two days, and then codeia substituted, and under its steady use the sugar decreased. Diet: At first meat broth, milk, and a dry biscuit or small piece of toast; phosphoric acid lemonade. September 19th, doing well; partially restricted diet of milk, meat, green vegetables, half the usual quantity of bread, and saccharin for sugar. Urine clear, very small amount of sugar, and a trace of albumen. December 16th, 1892, still doing well.

A Form of Cerebral Disease Characterised by Definite Symptoms, probably a Localised Basic Meningitis.

A. JEFFERIS TURNER, M.D., Lond.

Resident Surgeon, Hospital for Sick Children, Brisbane.

THE following cases came under my observation while Resident Surgeon to the Children's Hospital, Brisbane. I am indebted to the courtesy of the members of the visiting staff of the hospital for permission to publish them:—

Though their exact pathological nature was not ascertained by dissection, these cases appear to form a distinct clinical group. All were children of five or six years of age, one boy and three girls. In all symptoms of cerebral disturbance—vomiting, headache,—were followed by paralysis of one or both 6th nerves, causing internal squint, together with well-marked double optic neuritis. In three cases the disease followed an identical course, slow and gradual recovery. The fourth case (No. II) was only under observation for a short time, and though presenting the same symptoms, with the exception of the presence of great impairment of vision, it is possible that its real nature may have been different, though I do not think this likely.

Case I.—B.K., a boy aged six years, admitted into hospital December 28, 1889. Seven weeks before admission his mother first noticed the squint. The child was at that time suffering from whooping-cough. Lately he has had repeated attacks of vomiting. On December 23, after vomiting often for three days, he brought up a large specimen of *ascaris lumbricoides*, but no improvement followed, and he still vomits nearly everything. He has taken several doses of santonin, which have had no effect except in dislodging a few thread-worms. On January 25 it was noted that the vomiting ceased, but the internal squint persisted. The child was apparently otherwise well, but somewhat slow and dull. There was well-marked double optic neuritis found on ophthalmoscopic examination. On January 31st the boy was out of bed playing quite happily, and apparently quite well except for the squint, which was due to paralysis of the right external rectus. Pupils were dilated, the right rather larger, and reacted imperfectly to light. General and muscular nutrition good. Knee-jerks were not obtained. Cremasteric, abdominal, and scapular reflexes active. Plantar reflex slight. Treatment consisted in administration of Ol. Morrhuæ and Syr. Ferri. Phosph. co. The squint gradually disappeared, and on June 10 no trace of it was left. Two years later, on April 21, 1892, I saw the boy again. He had then been quite well since his discharge from the hospital. There was no trace of squint, and optic discs appeared quite normal on ophthalmoscopic examination.

Case II.—B.M., a girl aged six years, was admitted into the hospital on September 12, 1890. She was quite well until three weeks before admission. Her illness began with attacks of vomiting, which lasted for a fortnight, and were accompanied by bad headache. She only remained in the hospital four days. During that time she complained of frontal headache, which

appeared to be severe. There was no vomiting. She was very emotional, always showing signs of weeping. This disposition was not, according to her mother, natural to her. There was occasionally a slight internal squint, which appeared to be due to weakness of right external rectus. Ophthalmoscopic examination showed double optic neuritis of moderate severity. After her discharge from hospital her mother noticed that her eyesight was much impaired. On September 25 she appeared to be unable to count fingers correctly. I have not seen her since that date.

Case III.—A.C., a girl aged five years, came under observation on October 19, 1891. Her history was as follows:—Three years ago she had a feverish attack, accompanied by internal squint and derangement of consciousness. The squint lasted two days. There was no vomiting and no convulsions. She has been perfectly well since then until lately, except that she has been subject to headaches. Three weeks ago she had a bad cough. She has complained of pains in the head every day during the last two weeks. Her mother thinks her sight is impaired. An internal squint appeared on October 17. There is some family history of phthisis on the mother's side. The squint was found to be due to paralysis of the left external rectus. There was distinct double optic neuritis. The symptoms persisted till October 30, when she was admitted into the hospital. A very guarded prognosis was given, as the presence of some tubercular mischief in the cranium was suspected. The treatment adopted consisted in the administration of Ol. Morrhuæ and Syr. Ferri Phosph. Co. While in hospital her condition gradually improved, until on December 16 it was very nearly normal. There was scarcely a trace of squint remaining, both external recti acted well except in extreme outward movement, when they showed a slight deficiency. There was hardly any appearance of optic neuritis left on either side.

Case IV.—A.W., a girl aged five years, was admitted into the hospital on January 23, 1892. She had had no illness until eight days before admission, when she complained of pains in the back and head, also in the chest, shoulders, and arms. Next day she had an inward squint of the left eye. She had attacks of vomiting during the first two or three days. Pains in back had persisted, and appeared to be severe, causing her to scream. On admission there was complete paralysis of the left external rectus, with some weakness of right external rectus. There was double optic neuritis, the outline of optic discs being totally obscured, with irregular white streaks radiating outside their margins, and the vessels being partly covered by exudation. She complained sometimes of pain in the back, and sometimes of frontal headache. There was constant rigidity of the posterior cervical muscles, with retraction of the head. On March 6 this rigidity and the pains had disappeared, but there was no change in the oculo-motor paralysis, nor in the optic neuritis. On March 29 there was some recovery of power in the external recti, and her general condition being very good, she was allowed to go home and attend as an out-patient. On April 5 the squint was still well-marked, but on testing movement it was found that each eye could move outwards until corneal margin reached the commissure, but with exaggerated internal deviation of the other eye. Ophthalmoscopically the optic neuritis had much abated, the external margin of each disc was clear and distinct, the internal a little hazy. There were only traces of exudation left within disc. General health good. On July 22 there was only a trace of squint remaining, visible on extreme lateral movement. This case was treated with iodide and bromide of potassium, and blistering fluid to the back of the neck.

To the preceding histories it should be added that the temperature remained normal in all throughout. In one case there was during convalescence a single rise to 100·4, associated with some diarrhœa, which was certainly an accidental complication. In the last and most marked case the temperature was remarkably regular, never rising above 98·2, nor falling below 97·8. In no case was there any evidence of disease of the middle ear.

The whole importance of these cases lies in the fact that they form a distinct clinical group, which it is important to recognise, especially in order to form a correct prognosis. There can, I think, be little doubt that the optic neuritis, and paralysis of the sixth nerves depended on organic disease in or near the base of the brain. The long course and exposed position of the sixth nerves renders them, as is well known, specially liable to suffer from disease in this situation. The progress of the disease in, at least, three cases out of the four is sufficient evidence that the lesion was not a morbid growth. It is true that tubercular cerebral growths do, very rarely, undergo retrogressive changes and become quiescent, but this scarcely affects the preceding statement. On the other hand, it is highly probable that the lesion was a localised meningitis. The headache (present in three cases) and vomiting (present in three cases) are consistent with this diagnosis. In Case III there is a history of a somewhat similar attack three years previously, which was probably of the same nature. In Case IV there was persistent retraction of the head—a symptom which is frequent, and characteristic, in inflammation of the cerebral meninges. The absence of convulsions, stupor, and delirium may be accounted for by the immunity of the meninges in the neighbourhood of the cortical motor centres and cerebral convolutions generally. On the other hand, optic neuritis is, as *Gowers* remarks (*Diseases of the Nervous System*, Vol. II, p. 305), a common symptom of meningitis of the base. The localised nature of the inflammation and its comparatively slight intensity will sufficiently explain the absence of pyrexia, which is not a prominent symptom of meningitis. There was absolutely no reason to suspect any connection of these cases with syphilis. They had, however, *primâ facie* the appearance of incipient, slow-growing, tubercular mischief, and were at first diagnosed as such. The recovery of the first case did not appear to me to negative this diagnosis; but the uniform course of that and the succeeding cases justifies us, I think, in concluding with certainty that they were not tubercular.

The treatment adopted was of a simple character: Rest in bed, careful diet, and tonics, and in one case the administration of iodide of potassium and application of blistering fluid. Possibly, if more vigorous treatment had been adopted (for instance, mercurial inunction) the natural tendency to recovery might have been overlooked.

“Is Beri-Beri Endemic in Melbourne?”

C. H. MOLLOY, M.D., CH. B. (Melb.)

Resident Medical Superintendent, Melbourne Hospital.

ABOUT March, 1888, nine Chinese were brought to the Alfred Hospital from a cabinet-maker's shop off Little Bourke-street, the Chinese quarter of Melbourne. Their chief complaint, so far as could be gathered from them, was loss of power in the legs, accompanied with pains, and an œdema more or less general. Since then similar cases have continued to come under observation, and during the last Congress of 1889 several were exhibited to visitors to the hospital. The following is a brief description of the series necessarily incomplete, owing to the difficulty of being able to obtain a competent interpreter:—

Most of the sufferers appear anæmic, all complain of pains, variously described as rheumatic, cramp-like, jumping, and very severe, judging by my only guide, the Chinese epithets employed. They are fairly continuons, and worse when the patient is moving about. Their seat is chiefly described as being in the legs, more especially the calves, and not particularly in the region of the joints, but, wherever situated, both limbs are symmetrically affected. They may also occur—but more rarely—in the arms, across the back, and in the epigastrium. Associated with these are various paræsthesiæ, feelings of tingling, heat, cold, and tightness of the skin. On examining the limbs, wasting is rarely found; usually there is a plump appearance, but the muscular tissues are soft and flabby to the touch. Tenderness, either on light touch or deep pressure, is a variable symptom, and there are no particularly tender spots along the course of the nerves. As regards alterations in sensation, it is difficult to judge, but in a few cases there was said to be anæsthesia of the skin in parts. Absence of the deep reflexes is an almost invariable sign, even in the earliest stages. The next trouble is the loss of power in the limbs, more especially the legs. This may vary from a feeling of weakness and weariness, on even slight exertion, to complete inability to stand up or walk. In the arms it is usually slight, the patient not being able to carry on his ordinary work, whatever it may be, as well as usual. As regards gait, there is often nothing marked; more rarely it is ataxic, or there may be foot-drop present.

The next most noticeable sign observed—but not in all cases—is an œdema, beginning in the lower limbs, which are distended, soft to the touch, and pit on pressure. This may extend to the trunk, arms, especially the hands, to the face, and occasionally the peritoneal cavity. The cause of this œdema is hard to explain, none of the usual heart or renal lesions being present. Temperature is normal or sub-normal. Anorexia and nausea were often complained of, and in nearly every case there was shortness of breath on exertion. Functions of bladder or bowel were not involved.

In spite of the unpromising outlook, with removal to hospital, generous diet, and tonics, even the most severe cases quickly recover, the longest taking two months. There is a tendency to relapse.

In the first batch of nine struck down almost simultaneously in the same shop, inquiries as to causation elicited nothing as regarded lead, alcohol, opium, but went to show that their work was hard, their hours long, and that they lived and slept under most unfavourable hygienic conditions; that their diet was of the most meagre description, lacking the nitrogenous and vegetable elements. Of the subsequent cases, some occurred in batches in similar shops, but others came from the Chinese gardens around the suburbs of Melbourne. Europeans do not seem to become similarly affected without an obvious personal cause.

As regards possibility of contagion, the majority of the cases are not recent arrivals—of the first lot one was, but was stated to have been quite well on landing. One of the next cases in sequence—and a bad one, too—occurred in a carpenter's shop next door to that in which the first outbreak occurred. Cases of beri-beri have been imported here; one ship arrived with several just about the time the first cases came under notice, but no connection could be traced.

In conclusion, I have brought this incomplete paper under your notice in the hope of finding (1) if other practitioners throughout Australasia have observed similar cases among the Chinese; and (2) whether experts would class these cases, of what seem to me epidemic neuritis plus dropsy, as beri-beri.

Hypnotic Suggestion and its Therapeutic Value.

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It would not be fitting that a subject which has aroused so much interest in medical circles both in Europe and America, and which promises in the future to become even more prominent, should be left unnoticed by this Congress. I refer to the subject of hypnotism, which should command our attention either from the striking physiological and psychological facts involved, or, what is of more importance, from the remarkable therapeutic success which has followed its employment in many disorders. There is doubtless nothing new under the sun, and hypnotism is really only the old animal magnetism, or mesmerism, stripped of some of its extravagances and given a scientific, or quasi-scientific, basis to stand on. Where the theory of hypnotism differs fundamentally from that of animal magnetism is in the explanation of the nature of the influence which brings about the hypnotic state, or hypnosis. The patient, according to the mesmeriser, was magnetised by a vital fluid, which passed into his body from the finger tips of the operator, and any benefit which ensued was due to this influx of magnetic fluid. Further investigation, on more scientific lines, has found this a perfectly needless hypothesis, as most, if not all, of the phenomena, thought to be caused by outside action, have been shown to be subjective. The curative agent, instead of being the surplus vitality or magnetism of the mesmerist, is simply the mind of the subject exerting a beneficial influence on the body. It has ever been a truism in medicine, that what is called the mind exercises a wide and potent influence over the various functions of the body. And yet it has not been adequately recognised how widespread this influence is, and what a part it plays in the sphere of therapeutics. This certainly is the efficient factor in the so-called faith-healing of the present day, and in the wonderful and well authenticated cures which occur at various shrines, notably that of Lourdes. It is a fact that patients are sent occasionally from the Salpêtrière at Paris to Lourdes when medical treatment fails to benefit them. The success of true homœopathy, of the Mattei system, and of many quack medicines, is due mostly to the suggestion, by various means, of the idea of cure. This suggestive method is used very largely, though often unconsciously, by medical men, all of whom recognise the great value in many cases of the expression of a hopeful prognosis. The cure of disease by direct mental action has often been obtained in cases where there have been concentration of attention on the idea of cure, and expectation that a favourable result would be forthcoming. As, unfortunately, these conditions for effecting a cure could not be produced at will by any known methods, it was manifestly impossible to get anything of practical value out of a means of treatment which seemed to promise much in certain cases.

But with the scientific study of hypnotism came the discovery that the chief and fundamental characteristic which underlies the hypnotic state is not any of the phenomena like catalepsy, or loss of volition, which popularly are sometimes synonymous with hypnotism, but consists of a purely mental condition—the increased susceptibility to suggestions from without. This

capacity for being influenced by suggestion is not confined to the hypnotised state. All people, including those who cannot be hypnotised, possess it in a greater or less degree. So much is character moulded by it that all education may be said to be a process of suggestion. So suggestion in the waking state and during hypnosis differs only in degree and intensity. Occasionally persons can be found to whom delusions can be suggested while awake, and others who, though hypnotised very deeply, are hardly, if at all, susceptible to suggestion. But these are exceptional cases, and as a rule it may be said, if the hypnotic state be produced, the mind, acting through the nervous system, may be forced to react on the bodily functions in the way desired by the physician. So this hypnotic suggestion is veritably a system of "Psycho therapeutics"—a faith healing, with the faith ensured, and to be depended on.

It is not easy to give a satisfactory definition of hypnotism. It is a psychical state which presents many analogies to, and some differences from, natural sleep. As to what the state really is, or the ultimate cause of its production, little is as yet known. It seems that the immediate cause of the state is the suggestion made to the subject that he will pass into hypnosis. He is suggested into the hypnotic state. This can be done in various ways—by pure verbal suggestion among others, repeating the phenomena of oncoming sleep to the subject, and assuring him that they are present in him. This is the favourite method in France, and is certainly the best; but it does not succeed with the majority of Anglo-Saxons. They need the suggestion conveyed to them along other channels, and so various ways have been devised to do this.

The commonest one is to throw a strain on the ocular muscles by directing the subject to fix the eyes on an object held near to them. Anything will serve for this purpose—a coin, a pencil, or preferably the fingers. By this the attention is kept fixed on the idea of approaching hypnosis. It is possible that there may be some other factor at work as well as suggestion, but it is certainly the principal one. With blind people, listening to a watch is usually effectual, and stroking and passes are very efficient suggestions for the same end.

The state resulting from the employment of these methods varies much, the common basis being, as before said, the increased receptivity for suggestions either from without or within. It has been the fashion to divide the hypnotic state into various degrees or stages, in accordance with the presence or absence of certain phenomena, or, more properly, with the degree of inhibition of function produced. Thus, Professor Bernheim, of Nancy, makes nine degrees of hypnosis, the lowest being where there is only a slight drowsiness in the subject, and the highest where so-called somnambulism with the ability to perform post-hypnotic suggestions is present. The intermediate states are characterised by various phenomena, such as inability to open the eyes, catalepsy, continued automatic movements, loss of consciousness, and forgetfulness on waking. I believe, however, that this is an unnecessary refinement of division, and my experience has led me to recognise three classes, to one or other of which all persons influenced can be relegated. They are—I. Somnolence; II. Light Hypnosis; III. Deep Hypnosis. The first degree of hypnosis is characterised by drowsiness. This may be so slight as to be unrecognised by the subject, who may deny that he is influenced at all. He may be able to open the eyes easily, and the only proof of the presence of the hypnotic state may be in the success of the suggestions directed towards the ailment present. In the second degree, light hypnosis, consciousness is still

present, and the subject remembers everything that has passed, after he is roused; there may, however, be present inability to open the eyes, the various phenomena of catalepsy and powerlessness to stop movements impressed upon the limbs. In deep hypnosis, or somnambulism, there is usually complete unconsciousness and amnesia on waking. At this stage only can so-called post-hypnotic phenomena be evoked. One or other of these stages can be induced in the vast majority of individuals. Probably only about 10 or 15 per cent. are insusceptible, and in many of these cases it is impossible to find a reason why this is so. To rouse the subject, it is only necessary to say, "wake up." As he almost invariably comes to himself at once, there cannot be any very profound mental change during hypnosis. I have never seen or heard of a case where the patient could not be roused, though the popular mind credits the fiction that often a mesmerised person cannot be "unmesmerised" by the individual who has influenced him. This may lead to a consideration of the dangers of hypnotism, among which the impossibility of rousing a person is not one. As far as I can learn, there is no record in the modern practice of hypnotism of any untoward results from its use. There has been no unstable nervous equilibrium, hysteria, or insanity produced, though the opponents of hypnotism have confidently asserted that all these are the natural outcome of it. The worst I have seen has been headache and giddiness in some cases where the eyes had been severely strained. There is no doubt, however, that in a few cases, after repeated hypnotisations, the subject can acquire the habit of passing very readily, or even spontaneously, into hypnosis, and when influenced will obey blindly any suggestions given. This manifestly renders him open to serious dangers, and to safeguard against these it is necessary that the practice of hypnotism should be restricted to competent and conscientious persons. The necessity for this has been recognised in several countries, Belgium and Russia among others, in these only medical men being allowed to use hypnotism. The Committee on Hypnotism of the British Medical Association is expressly emphatic on this point; and the possibility of the abuse of hypnotism is a subject which must sooner or later engage the attention of our legislators in Australia.

Physiologically the hypnotic state is of much interest. Various phenomena, such as vascular changes, deepening of the respirations, increased frequency of deglutition, sweating, and muscular tremors, may be present.

But the effects which can be produced by suggestion are much more remarkable. They include all the degrees of catalepsy from slight stiffening of some of the muscles to complete rigidity of the body, anæsthesia, paralysis of the limbs, the slowing or quickening of the respiration or circulation, the setting up of peristaltic action of the bowel and consequent evacuation, or, *vice versa*, the prevention of the effects of purgatives, and—most wonderful and rarest of all—the production of stigmata and blisters by pure suggestion.

I come now to the therapeutic applications of hypnotism. The hypnotic state *per se* is of little value. It is only a means to obtain the increased suggestibility which is the efficient agent in the treatment of disease. By suggestion various effects may be produced on the nervous system similar to those that are got by the physical action of drugs. Thus, in many cases, by purely psychical means, a sedative or stimulant action can be obtained at will on the nervous system, or disordered function can be controlled and regulated. The sensation of pain can also be negatived for a time or altogether, according to the case, by the simple suggestion to that effect. In fact, it may be

said that hypnotic suggestion is a possible method of treatment in all cases where there is an abnormal condition of the nervous system. In a certain proportion of the cases, even though hypnosis is produced, it will fail entirely, and in diseases of organic origin the benefit obtained will probably be due to the amelioration of the concomitant functional disturbances. As a nerve sedative, hypnotic suggestion has proved extremely efficacious in insomnia, writer's cramp, asthma, hay asthma, and spasmodic affections of various kinds, such as hiccough, coughing and sneezing, and nervous vomiting. In such cases it sometimes succeeds remarkably after all other remedies have failed.

As a nerve stimulant it has been successful in all sorts of paralyses, both when functional and when accompanying, if not caused by organic lesions. Thus some cases of hemiplegia, in which the process of recovery has stopped, rapidly improve under treatment. In the same way, too, the power of walking may be regained in locomotor ataxy.

But, perhaps, the most valuable use of hypnotic suggestion is its power of controlling pain. Whenever there is chronic pain, I believe the medical man should seek to procure relief by means of it before proceeding to the use of opium, cocaine, or other drugs. In all forms of neuralgia, in the intense pain of malignant disease and ataxy, and in painful rheumatic affections, I have often found it of the greatest service. Good results are often obtained in functional disturbances of organs. Thus palpitation, diarrhœa, constipation, menorrhagia, amenorrhœa, &c., have been successfully treated. I have had specially remarkable results in incontinence of urine, both in children and adults.

But besides these and many other disorders there are a number of affections of a psychical nature before which ordinary medicine is usually powerless, but which have been treated with success by hypnotism. Among these are the various psychic disorders of the sexual organs—"Psychopathia sexualis," as Professor Kraft-Ebing styles them—which include onanism, satyriasis, nymphomania, nervous impotence, sexual anæsthesia, and sexual inversion. Dr. von Schrenck-Notzing, of Munich, has just published a book in which details are given of a large number of cases of this kind treated successfully by hypnotic suggestion.

In cases, too, where there are delusions without actual insanity, such as syphilophobia, fear of walking in the streets, &c., or even some dominant idea (obsession) in the mind, the aid of hypnotism may be invoked. Lastly, it has been used in the treatment of inebriety, morphomania, &c., and in various vicious habits in children, such as bursts of passion, stealing, inveterate laziness, and filthy habits. In inebriety, unless we accept the accounts of the so-called "Keeley, or chloride of gold" cure, it seems to be the best and quickest means of treatment that offers at present.

In conclusion, I would say that I am far from advancing hypnotism as an infallible cure in the different diseases I have mentioned. In some seemingly most promising cases it fails completely; in others equally good results can be obtained by other means of treatment. And there are certain disadvantages connected with its use which I must mention. A number of one's patients look upon the whole thing as humbug, and conduct themselves accordingly; others expect miracles to be wrought, and are intensely disgusted if they do not come about at the first séance, and forthwith abandon the treatment. The majority discontinue the séances before it is advisable they should, and, if they are really benefited, ascribe the change to anything but the hypnotism. And nearly all believe only in the

"payments by results," and are insulted if you should suggest a fee for hours of tiresome and exhausting work spent in trying to hypnotise them. There is undoubtedly, too, a bad odour connected with the subject, which causes people to look askance at the medical man who dabbles in such things. I have known several doctors who had to give up using hypnotism in order to save their ordinary practice. Considerations such as these will certainly retard the advance of this science, but with us, as medical men who wish to perfect the healing art in all its branches, they will only be allowed their proper weight. For we are offered, I believe, in hypnotic suggestion, a potent means of dealing with the Ego in disease which the President referred to in his address, and which is often so intractable to ordinary treatment. I am confident that when more workers have entered this field, and its great scientific and practical importance is more adequately recognised, the way will be paved for a complete system of psychotherapeutics which shall be effectual in many maladies, both physical, mental, and moral, about which at present we have to confess our impotence.

Notes on Two Cases of Empyema, mistaken at their Onset for Peritonitis.

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A LITTLE over two years ago I saw a child of six years old screaming with pain, and her abdomen immensely distended. She would not allow anyone to touch her without crying out. Her temperature was 103° , pulse uncountable, but very rapid and feeble, and I could not discover anything abnormal in the lungs. I thought that she had peritonitis, and was in a very bad way with it; but after a few days the tympanites got very markedly better, quite disappearing in about twelve hours. I then discovered pus in the right pleural cavity. I put in a drainage tube. The temperature fell from 103° to normal within twenty-four hours, and she was quite well, with the tube removed, under six weeks.

At the beginning of last month I saw a child of three years old. For four days she had a high temperature— 102° to 104° —but she had no abdominal or head symptoms, and I could detect nothing wrong with her lungs, and she was in no pain. Her abdomen then suddenly became markedly tympanitic, and for five days she was very ill with shallow respiration, and several times I thought she was dying. The tympanites then almost entirely disappeared in a few hours, and next day fluid was discovered in the right pleural cavity. This was of a dark turbid appearance, and in a week's time was purulent. I then put in a drainage tube. Though there was free exit for pus the temperature kept about 101° or 102° for a fortnight, when it remained at about 99° for a week, and now, I regret to say, is rising again, though the pus discharge is getting much less, and the lung apparently filling out.

There is a possibility that in this case the empyema was due to tubercle, and there may also be meningitis, though the symptoms are as yet hardly conclusive. At any rate, the point in these two cases, which I have not observed noticed in any of the text-books, is sudden tympanites and symptoms simulating peritonitis being due to pleurisy, and the rapid cessation of the abdominal symptoms being co-incident with effusion of fluid in the pleura. The referred pains of pleurisy in the shoulder, arm, epigastrium, crest of the ilium, &c., are, of course, familiar to everyone, and I have often observed that as the effusion comes on these pains improve. Clifford Albutt states that referred pains in the arm are chiefly observed in diaphragmatic pleurisy. The explanation, I suppose, is to be found in the origin of the phrenic, from the fourth and fifth cervical.

Two very curious cases are given in Fagge's "Practice of Medicine," on the authority of Von Barendsberg, in which obstinate vomiting ceased after an eruption of zona over the skin, supplied by the fourth cervical nerve. He explains this on the supposition of sympathetic irritation of the vagus and phrenic nerves.

If this be the true explanation of these cases, I think it possible that the irritation of the nerves supplying the pleura might, on account of their connection with the dorsal ganglia, stimulate the splanchnic, and bring tho

intestines to a state of rest, producing tympanites and pain, and that this irritation would be removed on the inflamed surfaces of the pleura being separated by fluid.

If sympathetic irritation of the splanchnics were not the cause of the tympanites, I do not know what was. In any case, the practical point is that pleurisy may be the cause of a distended abdomen, and that when effusion occurs there is complete relief of abdominal symptoms; and the lesson I have learned myself is to examine the lungs daily in supposed cases of peritonitis in children, and not be content with one examination at the outset of the symptoms, as in both cases I have made a similar error. Finding no physical signs in the lungs at first, I put down all the symptoms afterwards to peritonitis, and only examined the lungs again on the abdominal symptoms suddenly subsiding without relief to the general symptoms. (Dr. Fleming writes, on the 20th October, to say that "the second child mentioned is now quite convalescent; the tube has been removed, the opening has closed, the temperature is normal, and she is running about, taking food well, and putting on flesh."—Ed.)

Some points in Etiology, Prevention, and Treatment of Phthisis.

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Koch, in his celebrated Berlin address of 1882, demonstrated beyond the possibility of doubt that a bacillus was the cause of tuberculosis. He declared that this bacillus was a true parasite, whose proper "habitat" was the animal body, outside of which, although it may exist for a considerable time, it cannot grow and propagate. He also taught that tuberculosis was for the most part disseminated amongst human beings through the agency of inspired sputum-dust containing the bacilli. Koch's distinguished lieutenant, Dr. Georg Cornet, in his thesis on "The diffusion of tubercle bacilli external to the body," has most ably upheld this view. According to him, the bacillus is a comparatively heavy body, sinking in water and pus, and clinging to moist surfaces. It cannot escape by evaporation, and is not ordinarily carried by air-currents. Hence, it is not often found in the breath of persons affected with phthisis. This latter and most important point has been confirmed by a series of investigations and carefully-executed experiments, and notwithstanding some observations by Dr. T. C. Williams, Ransome, and others to the contrary, I think it may be accepted as proven. Were it otherwise, the dissemination of phthisis, great as it now is, would be a hundredfold greater. Cornet has shown that bacilli in the expectoration of consumptives may retain their virulence for at least six months; that this expectoration becoming dried and pulverised, clinging to walls, floors, furniture, and hangings, is again and again disturbed from its resting-place by brushing and dusting, and is thus distributed in the atmosphere of the apartment, and inhaled by its occupants. That there are other modes of infection, such as the partaking of the milk and flesh of diseased animals, &c., it is impossible to doubt. Nevertheless, Koch and Cornet's doctrine, that the inhalation of sputum-dust containing tubercle bacilli is the most usual way by which tuberculosis is disseminated, is backed up by the largest amount of evidence, and is now held by the most competent observers.

Allowing then that the bacillus is the *vera causa*, there are probably other factors in the causation of the disease. In order that the bacillus may grow and propagate, it must find a suitable soil in a state of preparation. The human body is such a soil, but it is not always in a state of preparedness. There can be little doubt that some persons—perhaps certain races—are more predisposed to tuberculosis than others, and that this predisposition is hereditary. But those who inherit such a tendency are not always in a state of preparedness. As long as they are in good health they may be able to resist the invasion of the disease. The bacillus gains its position with difficulty, holds it with difficulty, and is slow in propagation. The human body does not immediately succumb to the attack of the enemy; it offers a stout resistance, and frequently succeeds in repelling the invader. There is good reason for believing that a sound bronchial membrane is capable, under ordinary conditions, of resisting the inroads of the bacillus. But if its epithelium be weakened, or in part destroyed, by frequent or prolonged irritation, it may not be able to oppose an effective barrier to the

invader. Hence neglected or often-repeated attacks of bronchial catarrh, by enabling the bacillus to gain a footing, may be the starting-point of phthisis. An apparently opposite view, viz., that chronic bronchitis is a bar to phthisis, is held by some; but I think the vast preponderance of evidence is in favour of the former opinion. In its favour also is the analogous condition of infection in diphtheria, the specific bacillus of which appears to be powerless for harm in the presence of healthy mucous tissue.

By those who hold the above-stated view regarding the etiology of phthisis, the means of prevention must naturally be directed towards (a) hindering the dissemination of the tubercle bacillus outside the body, and (b) rendering the body an unsuitable habitation for it.

(a) *Hindering the dissemination of the tubercle bacillus outside the body.*—The difficulties in the way of accomplishing this are undoubtedly very numerous, but they are not insurmountable. The phthisical patient should be instructed to expectorate into a cup or spittoon—a small bottle-shaped one may be carried in the pocket—never on floors or carpets. The sputum should be destroyed by fire. The use of a handkerchief for the reception of the sputum should be discouraged, and all handkerchiefs used by consumptives, when discarded, should be kept soaked in a vessel containing a disinfectant, and then boiled. A bedroom occupied for any considerable time by a consumptive should be thoroughly cleansed and fumigated, and the bed-clothes and hangings should be either boiled or super-heated in a properly-constructed chamber before being used by another person. That the neglect of such precautions must, and does in many instances, lead to the transmission of the disease can hardly be doubted. The recent light thrown on the etiology of phthisis surely points to the danger lurking in the cabins of ships and the bedrooms of lodging-houses and hotels, occupied for weeks or months by patients suffering from the disease, and almost certainly impregnated with its germs. In the face of such danger it is to be hoped that our sanitary authorities will, in the immediate future, exercise some proper supervision over passenger-ships, hotels, lodging-houses, schools, factories, &c., and will adopt such measures as the more recent knowledge gained by scientific research has shown may be more or less effective in controlling the spread of so dire a disease. Dr. Bennett, a very capable authority, writes as follows on this subject:—"I, myself a consumptive, cured more than a quarter of a century ago, should now refuse to travel at sea in a cabin with a consumptive fellow-traveller in advanced disease, as I should refuse to inhabit the large hotels in the Engadine, where scores, nay hundreds, of consumptives, in all stages of disease, now congregate every winter, poisoning the air which they breathe, in a climate where free ventilation—ventilation as I understand it—appears to be an impossibility." Although phthisis is seldom or never transmitted directly from parents to their offspring, there can be little doubt that a constitutional tendency towards the disease is often hereditary. Who is there amongst us who cannot out of his own experience point to families two-thirds of whose members have died of it? Since the contagiousness of phthisis has been accepted as a fact, this mortality from it in certain families is held by some authorities to be due not to a predisposition, but to an infective focus in the home. Without denying that many cases may be accounted for on this hypothesis, it cannot cover the numerous instances in which the same fatality has dogged the footsteps of those who have early in life left the old home, and have dispersed themselves in different parts of the world. If

this view be correct, it follows that the members of phthisical families should not intermarry. Children, one or both of whose parents are phthisical or have the phthisical tendency, ought to be reared in the country whenever that is possible, and every attention should be directed to their physical development and the strengthening of their constitutions. I need hardly say that a mother already affected should not be allowed to suckle her child.

(b) *Rendering the body an unsuitable soil for the tubercle bacillus.*—The experiments of Villemin and others on guinea-pigs clearly show that animals whose health is impaired by close confinement and poor feed are in a much larger proportion of cases affected by tuberculosis when exposed to contagion than are healthy animals, and without doubt the same holds good with regard to human beings. Whenever the crowding together of human beings is associated with insanitary surroundings, there for a certainty will phthisis be found. Dr. Ransome, in his paper on "Tubercular Infective Areas," says:—"In certain streets and courts consisting of back-to-back houses, unfurnished with thorough ventilation, tubercular disease was much more common than in other parts of the same town." It is notorious that in the same localities the mortality from phthisis is much greater in persons who follow indoor occupations (excluding noxious trades) than in persons who are employed out of doors. The reason probably is that the former are more exposed, and for longer periods of time, to contagion, and their health is more enfeebled by confinement and living in a foul atmosphere. Those who have a constitutional tendency to consumption are also, I believe, predisposed to bronchial catarrh. They easily and frequently catch cold, and the means resorted to for prevention, viz., over-clothing, protection from changes of temperature, confinement in close, warm, and ill-ventilated rooms, are entirely inadequate to the end in view. The way to overcome such delicacy is to "harden" the body by occupying only cool, well-ventilated rooms, by regulated exercise in the open air, and by wearing the lightest clothing that is compatible with comfort. In addition, the frequent and profuse application of cold water to the skin will be found a very effective measure against the tendency to catching cold, as well as a useful means for giving tone to the system.

TREATMENT.

When the discovery was made that a bacillus was the *vera causa* of tuberculosis, we seemed to be within a reasonable distance of finding a cure for the disease by attacking the parasite. With this end in view, many and varied substances which, in the laboratory, were proved to have the effect of either destroying the bacillus, or inhibiting its growth and increase, were administered by the stomach, by inhalation, or by direct injection into the pulmonary tissues. So far the desired result has not been obtained, because experience has shown that the drug could not be introduced into the system in sufficiently large quantity to destroy the parasite without also killing the host. This method of attack having so far failed, attention was next directed to rendering the soil unsuitable for the maintenance of the parasite, but with no better result. Koch's tuberculin treatment is the most notable attempt in this direction, and although it has failed to accomplish what was expected of it, there is reasonable ground for hope that some similar plan may be more successful. Whatever may be said to the contrary, the fact remains that no medicinal substance yet tried has had any material effect in either curing or arresting the progress of phthisis. I do not for a moment wish it to be understood that drugs are useless. On the contrary, I believe that under certain circumstances they may, and do lend, us material help; but what I wish

to maintain is, that in the treatment of phthisis they are entirely subsidiary to other means. Under the old dispensation, when close confinement and the extensive employment of medicines were so much in vogue, the percentage of recoveries was very small. In the present day the outlook is far more hopeful, and we now know that many consumptives when placed under favourable conditions recover entirely, or at all events regain their ordinary condition of health. Three years ago Dr. Theodore Williams, of London, reported that of 141 cases of phthisis under his care, who were sent to the mountains, 70 per cent. were greatly improved, and that in 30 per cent. complete recovery took place. There can be little doubt that such a favourable result was due, for the most part, to the purity of the atmosphere by which they were surrounded, and to the open-air life which they necessarily led.

Without entering into a discussion on the vexed question of phagocytosis, and the part played by the tissues and fluids of the animal body in disposing of foreign substances introduced into them, we do know that the living body is not a passive instrument in the hands of its enemies, but that it offers a stout resistance, and often succeeds in expelling or destroying them. When the body is in perfect health its power of resistance to disease is greatest, and this resistance is lessened in proportion as the health declines. It is doubtful if anyone in robust health contracts phthisis; at all events there is a strong probability that in a large proportion of cases there has been some previous impairment of general health. Most of us are frequently exposed to the contagium, and we often inhale the bacilli in large numbers. Why is it that we do not succumb to their attack? Is it not probable that it is because our power of resistance at the time is greater than their power of attack; and that it is only when the exposure is very prolonged, and the standard of our ordinary health has been considerably lowered, that the bacilli gain a firm footing, and a struggle for life or death ensues?

Now comes the question, Is it possible to get the body already occupied by the parasite into such condition as will enable it to combat successfully with the invader, and to resist subsequent attacks? I believe that it is so, and that recovery might be expected in a considerable number of cases, when the attending inflammatory process has not caused excessive destruction of tissue. In a large proportion of phthisical cases the disease is not always progressive. Its advance is by steps; there are many arrests on the way, and its progress is often stopped for a time. How can we account for these frequent arrests and subsequent exacerbations of the disease. I believe them to be due to re-infection—either from within, auto-infection, or from without, in the dwelling. Two factors, separately or conjointly, are at work—(a) a lessened resistance of the bodily tissues, and (b) the presence of bacilli in large numbers, either within the body or in the dwelling occupied by the patient. Measures intended to improve the general health are indicated, and the dwelling should be thoroughly disinfected or changed. The chief means by which both objects may be attained is keeping the patient constantly surrounded, both by day and by night, by pure air. It is also highly important that his sleeping-apartment should be thoroughly exposed to the morning sunlight. Koch and others have shown that sunlight is inimical to the tubercle bacillus and to other low forms of vegetation, and we know that the deprivation of it for any considerable time involves the decline, if not the actual death, of the higher forms of vegetable and animal life. Although precise data regarding the action of the sun's

actinic rays are not as yet available, there can be little doubt that they play an important part in health and in disease. This point has been well insisted upon by Mr. Candler, of Melbourne, in his interesting work on the "Prevention of Consumption." Although I am unable to agree with him in his contention that sunlight alone can efficiently deal with the bacillus of tubercle, and that by its sole efficacy the disease can be stamped out, I hold that it is an important adjunct in the treatment of phthisis, and that its purifying and health-giving attributes are not sufficiently utilised by us in our dealings with the sick and the delicate. The *sine qua non* then in the treatment of consumption is keeping the patient constantly surrounded both by day and by night by pure air. The highest degree of atmospheric purity is only obtainable at lofty mountain elevations and on the sea. The choice must depend upon circumstances and the individual peculiarities of the patient. The aggregation of large numbers of consumptives in the big and fashionable hotels of the Swiss highlands and other favourite resorts of consumptives is an unwise procedure, and likely to be attended with considerable risk of re-infection, on account of the contaminated atmosphere of such establishments. The comforts and luxuries obtainable in them possess great attraction for the majority of people, but the interest of the patient will be best conserved by choosing some less-frequented resort, where inferior accommodation is counterbalanced by the great advantage of living in an undefiled atmosphere.

How is this open-air treatment to be practically carried out? During the daytime and in fine weather there is of course no difficulty; but the surrounding of the patient with a pure atmosphere during the long hours of the night can hardly be accomplished except by his sleeping out in the open air. Of course this important step in the treatment can only be reached by degrees, and in many cases only under suitable conditions of climate. Most of us are accustomed to associate a something harmful with the night air. It is a fallacy to which we cling through mere force of habit. Except in malarious districts, or when the night temperature is exceptionally low as compared with that of the day, need any danger be apprehended from sleeping out? The experiment has been recently tried at a sanatorium for consumptives in Germany, and with considerable success. The patients slept in hammocks under pine-trees, and had better sleep and were always more refreshed in the morning than when they passed the night within doors. But to show that even a very low temperature can be borne by the consumptive, not only with impunity, but with actual benefit, I have only to remind you of the case of the Russian Grand Duke, who was sent by his physicians to reside in the upper slopes of the Caucasus Mountains. In this inhospitable climate he occupies quarters which are open by night as well as by day to the winds of heaven, not even cheered by the presence of a fire, and under this apparently harsh and barbarous treatment he is said to have nearly, if not quite, recovered from consumption. I need hardly say that the sensitiveness of skin and bronchial mucous membrane produced by over-clothing and by living in foul stuffy rooms must be gradually overcome by outdoor life, and by cold-water douching, before it is safe for the patient to sleep in the open. In some cases, and under certain conditions, sleeping out might not be feasible, and then the next best thing to do is to keep the windows of the patient's bedroom wide open all night long. He may be protected from a too strong air-current by gauze blinds, or a light screen at the bedside. Tobin's tubes, or other ventilating systems, may be used in preference to open windows, though I prefer the latter; but, whatever be the means, the end aimed at is an *abundant* supply of fresh air. I

quote the following passage from Russell Reynolds' "System of Medicine," as showing the queer, absurd ideas about ventilation which were, up to quite recently, held even by members of the medical profession:—"The great end the physician should aim at is to surround his patient with as much pure air as possible, consistent with warmth and absence of draughts. In summer, *good ventilation* should be secured by letting down the windows *an inch* at the top."

The bedroom of the phthisical patient should be large and well lighted, and with such an aspect as will allow of its being flooded with the morning sunshine during a great part of the year. The walls and ceiling should be covered with a varnished sanitary paper, and the floor should be coated with turpentine and beeswax, and polished. It should contain no furniture beyond what is absolutely required, and should be destitute of hangings and carpets, with the exception of a small strip at the bedside. The whole of the walls and ceiling—the angles and corners receiving special attention—should be run over with a cloth, wrung out of carbolized water, and the floor-coating should be renewed about twice a week. In the houses of the poorer classes, where these arrangements are not practicable, it is at all events possible to enforce perfect cleanliness in the patient's surroundings. In addition to bareness of the room and ventilation through wide open windows, I insist upon thorough fumigation with sulphur fumes once or twice a week, and I direct the floor to be cleansed with a damp cloth, and then well rubbed with oil and turpentine every day.

The phthisical patient should, as a matter of course, lead the most regular life, not only doing what is requisite to improve his physical condition, but also carefully avoiding everything which might have a lowering influence on his general health. How is it possible to expect a cure in the case of one who changes the sky perhaps, but in other respects lives according to his bent, and sets all the rules of hygiene at defiance? He smokes and drinks to excess, keeps late hours, frequents crowded theatres and stuffy unwholesome rooms—in fact, does just as those about him do, and nevertheless supposes that change of air *per se* will do all that in his case is required.

The food of the consumptive who is able to take exercise should be abundant and nutritious, milk and fats entering largely into it, and the meals should be partaken of at regular hours. Great attention must be paid to the condition of the skin, and in this respect nothing is more beneficial than frequent—one or several times a day—ablutions with tepid, and after a time, with cold water, followed by friction with a rough towel. Frequent exposure of the naked body to air and sunshine is also to be recommended.

The clothing should be made of light porous woollen material, and no more than is absolutely required should be worn. The amount of clothing apparently required by any particular person is mostly a matter of habit. One may be enveloped in a poisonous casing made up of a chamois leather singlet, several shirts, vest, coat, and overcoat, and still feel cold with the mercury standing at 75° Fah., while by a judicious management of the skin, and by a gradual lessening of the amount of covering worn, the same individual may be got to feel more comfortable at the same temperature in a shirt and trousers.

In conclusion, I firmly believe that until such time as a specific remedy shall have been discovered for the most fatal disease to which the human race is heir, improved sanitation in the dwelling and living in a pure, wholesome atmosphere are the most certain means at our disposal for the prevention as well as for the cure of consumption.

The Treatment of Asthma.

DUNCAN TURNER, M.R.C.P. (Lond.) and L.R.C.S. (Edin.)

THE notes in this paper will be confined to pure neurotic asthma and its complications, leaving out of consideration those dyspnoeas due to heart disease, intra-thoracic tumors, uræmia, &c. To fully discuss the treatment of this disease would be out of the question in a short paper like this. The writer will therefore confine himself to that part of the treatment that is not usually found in the ordinary text-books on the subject, and comments on the various therapeutic measures that have been proposed for asthma, and especially their drawbacks and contra-indications which have strangely escaped the many writers on this subject. The treatment of this disease, like many others, is a subject that is still far from being a settled question.

The remedies that have been recommended from time to time as infallible specifics are so numerous that the great difficulty the practitioner feels is which to choose. The absolute failure of these so-called specifics in many cases has tended to bring the medicinal treatment of asthma into undeserved disrepute, and a chronic asthmatic patient who has had experience of various modes of treatment is the most difficult and untractable "old soldier" patient a physician has to deal with. It is the opinion of the writer of this paper that the treatment of this disease is too heroic in many instances. Indeed, it is my firm belief that many lives are yearly sacrificed through over-zealous treatment, while the sufferers, if left to good mother nature, would recover and live many years. Asthma is such a distressing malady that a young practitioner is sorely tempted to plunge out of his depths in order to relieve his patient at all hazards. Nor is this to be wondered at, when we consider that a young medical man who has his reputation to earn is in danger of having his skill called into question if he fail to give the expected relief.

In treating a case of asthma the medical attendant must take into consideration the age of the patient. Is the attack purely neurotic, or is it associated with bronchitis, emphysema, or their complications? The constitution of the patient, the climate in which he has lived, the time of the year, the length of time the attack has lasted, &c., must all be thought of. It is the neglect of these precautions, and failure to make a clear and correct diagnosis before prescribing, that has brought about a great deal of scepticism, in regard to the therapeutics of this disease, which prevails amongst medical men as well as the laity.

The treatment of asthma divides itself into two parts—The *prophylactic* and the *treatment of the paroxysm*. The first of these, I need hardly say, is the most important. We will therefore glance at it first in this paper. No one, I think, who has had any experience in the treatment of this malady will deny that climatic treatment is the most important, and yields the best results—in fact, if we find a suitable climate for our patient, no other treatment is necessary. It is well known that asthmatics may live for years in a climate suited to them without a single attack of their complaint, and a change to an unsuitable climate is quite sufficient in one night to rouse up

the dormant neurosis. I have known patients who thought themselves completely cured of their malady deceived in this way much to their chagrin and disappointment. In ordering an asthmatic patient a change of air, we must be careful to send him or her to the proper place, and guard as much as possible against those contingencies that would render the change not only of no avail, but positively injurious. There are several reasons why change fails to give the expected relief, and of this we hear such wonderful stories concerning the air that cured one patient, but was almost death to another. Asthmatic patients are extremely sensitive, and a very small drawback in the house they go to is sufficient to upset all calculations concerning the expected good to be got from the change. For instance, the house may be damp, the room in which the patient sleeps may be dark and sunless, or a straw mattress or feather bed may be the exciting cause. Animals, such as dogs or cats, may have recently occupied the room. Any of these causes are sufficient to mar any good a patient is likely to derive from the air of the locality. Of all climates, mountain climate, some distance from the sea, is the one that suits most asthmatics best. If the house and surroundings are favourable, I have seldom known a patient that did not get immediate relief from an altitude of 2,000 to 3,000 feet. We must, however, be careful to exclude cases with heart complications, for a patient may have heart disease and spasmodic asthma at the same time. A dry inland climate, such as our own Riverina, is possibly, next to a mountain climate, the best for an asthmatic patient. I have notes of several cases of asthma in young men who resided in or near Melbourne, but who got absolutely clear of it by a prolonged residence in the dry inland plains. Unquestionably, a residence among our eucalyptus forests, if the climate is not too damp, is an excellent remedy. The next air that seems to suit a patient best is residence in the centre of a large town. The smokier the better. It is difficult to explain the rationale of this treatment, and its striking contrast to the air of the mountain that we have just mentioned. One thing is the absence of flowers and all vegetation, which are very poisonous to an asthmatic patient. The other is probably the minute quantity of sulphur in the coal-smoke, which seems to have a soothing effect on the tender membrane of the bronchi. Probably, another reason is the good drainage, and the absence of damp. Damp and draughts are as a rule two pet aversions of the asthmatic.

When the asthma is a pure neurosis, and the subject of it is young, residence at the seaside will often give relief. But the sudden changes of temperature on the south coast of our continent are highly inimical to cases of asthma. As a general rule, no more than 10 per cent. of patients that reside at the seaside benefit by it. The other ninety are made worse by it, and at least 50 per cent. cannot endure sea-air. The same remark applies to voyaging near the land. But where a patient is a thousand miles away from land in a warm latitude his complaint usually leaves him. Taking asthmatics as a whole, a sea voyage seldom benefits them, and in many instances aggravates their complaint.

The prophylactic treatment of asthma by medicines is not nearly so satisfactory as the climatic, for, so long as your patient is in an unsuitable climate, medicinal treatment, be it ever so vigorous, is seldom of much avail. But many asthmatics have, through force of circumstances, to live the best way they can in very uncongenial atmospheres, and for these unfortunate sufferers we are bound to do our best to palliate and relieve, if not to cure, by judicious medical treatment. Arsenic is, par excellence, far and away the best tonic in cases of asthma, three minims of Fowler's solution, gradually increased to

five or six minims, three times daily after meals. It is best given with tincture of quinine. But here I must give a caution. Arsenic is apt to produce an artificial catarrh in many patients, which, if not watched, may be a serious complication for the patient. I am always in the habit of cautioning patients against catching cold whilst taking arsenic for asthma, and I never administer it during cold wet weather or while the patient is travelling.

Next to arsenic, quinine is probably the best tonic for asthmatics, but to be made effective it must be given in liberal doses, about two or three grains three times daily. This medicine tends to correct any bronchial irritation, and is especially suitable in cases where there is a tendency to bronchitis. The next best tonics for asthmatics are the hypophosphites. They are unquestionably of great value, especially if the patient has a tubercular tendency. I frequently prescribe the hypophosphites in conjunction with cod-liver oil, and with excellent results. Salicin is another tonic of great value in those cases where there is a gouty or rheumatic diathesis. It can be given in doses of fifteen grains three times daily. The ordinary bitter tonics, especially gentian, are simply poison to an asthmatic. The rationale of this would be difficult to explain. Probably, this is the reason that nearly all asthmatics, when consulting a new medical adviser, will frequently warn him that whatever he prescribes it must not be a tonic, for that all tonics make him worse. Cascarella is the only exception to this rule, and I frequently prescribe the infusion as a vehicle for arsenic, hypophosphites, &c. Strychnine is a medicine of doubtful value in asthma, and I now rarely prescribe it except in combination with other tonics. Iron is another tonic of doubtful value in asthma. Some physicians praise it. My own experience of it is that it generally aggravates the complaint. The only form in which I now prescribe it is for children whose asthma is complicated, in the form of the syrup of the iodide of iron.

We must come to the class of remedies whose action in relation to asthma is somewhat obscure, but which is most powerful in arresting the disease. These comprise the iodides and bromides, and several others that need not be mentioned here. These remedies are, no doubt, all very powerful in keeping the disease in check, and so averting a paroxysm. The misfortune is that all of these, or nearly all, have their drawbacks. I am surprised that so few observers have noticed that iodide of potassium, so valuable as a remedy in such cases, is apt to convert a mild bronchial catarrh into a serious attack of bronchitis. I have repeatedly seen patients laid up for two or three weeks through the over-liberal use of this drug to cure a mild attack of asthma, which would have probably passed off of its own account in a day or two. We should, therefore, be very careful not to administer this remedy when the patient is liable to bronchitis, or when we have reason to believe that bronchial catarrh is at the bottom of the asthma.

The diet of asthmatic patients is pretty well understood, and need not be enlarged on here. The writer of this paper agrees with what is laid down in the ordinary text-books on the subject. One thing may be mentioned that I do not remember to have noticed—that is, fluids charged with carbonic acid gas are, as a rule, highly injurious to asthmatics. I always advise asthmatics not to drink any kind of aerated beverages. The general treatment of asthma consists in having a well-ventilated bedroom, for, in nine cases out of ten, the paroxysm comes on at night. The room should be well lighted, and face the morning sun, and be absolutely free from damp. Feather beds should be avoided, or even feather pillows. The bed and pillows should be made of well-cleaned hair. Asthmatics should avoid over-fatigue or sitting in crowded

assemblies, and, above all, they should beware of draughts. Travelling in railway carriages is specially dangerous in respect of draughts, and should be carefully guarded against.

The treatment of the asthmatic paroxysm is a subject of much controversy amongst medical writers. The remedies are so numerous that the difficulty is which to choose. In this matter we must be guided by the age of the patient, and what complications are present; the length of time the paroxysm has lasted; the exciting causes, &c. It is not enough to diagnose that the paroxysm is one of asthma. If the patient is young, and no suspicion of any heart lesion, probably a dose of antipyrin is the quickest, and, on the whole, a safe way of stopping an asthmatic paroxysm. But if there is any suspicion of any heart lesion, or the patient over 50, this remedy should not be administered. A far safer remedy in elderly, and people suspected of heart complications, is the citrate of caffeine, given in a little hot tea or coffee. In cases where there is suspicion of rheumatism or gout, the salicylate of soda, with iodide of potassium, acts like a charm. The same precautions with regard to the iodide of potassium must be observed that were mentioned in a previous part of this paper. Injections of morphia are much praised by some writers, and a young practitioner is very apt to use them indiscriminately. Their effect is so quick and magical that a profound impression is made on the patient. Here a practitioner must be very cautious. I have known a patient die in a quarter of an hour, after getting a morphia injection to relieve what was supposed to be a fit of asthma. And there are other dangers connected with morphia, apart from the well-known one of forming a morphia habit. This remedy is dangerous when there is bronchitis present or heart complications. The time-honoured remedy—the burning of nitrate paper and the whole tribe of nostrums sold by chemists, that have saltpetre for their base—I condemn; unquestionably they give quick relief, but they have serious important drawbacks which I wish to point out. I do not deny that a patient is quite justified in using one or other of these remedies when attacked suddenly, and there is nothing else at hand; but I do condemn the wholesale manner in which they have been used, and I seldom knew an asthmatic who had a lengthened experience of them but felt that their continuous use was a mistake; and, instead of curing the malady, they only perpetuate it, and cause it to get a firmer hold; although the paroxysm is stopped for the time being, the next one is hastened on, and the unfortunate patient is, in many cases, compelled to live a considerable part of his time in an atmosphere of saltpetre fumes, mixed with various narcotic herbs. The method by which they act is their power of causing free expectoration, and so relieving the gorged mucous membrane. It is a rough-and-ready method, but has the disadvantage of perpetuating the congested condition of the bronchial tubes—in fact, keeping the tubes in a chronic state of irritation, and so making them more tender and susceptible to any irritating cause that comes in the way, and by that means keeping alive the disease that it is intended to cure; and I advise all asthmatic patients that consult me to give up using them, whether they are cigars or one of the other numerous tribe of inhalants that are sold at every chemist's shop. *The inhalation of chloroform, iodide of ethyl, nitrite of amyl*, I condemn equally with the above. Although their action is very different to the fuming inhalants, their use is not to be encouraged; their action is only momentary, and their administration has to be kept up for some time to be of any value. Their use is not without danger, and, furthermore, they do not strike at the root of the

disease, but give temporary relief, and encourage the paroxysm to come at a shorter date than it would otherwise do if the whole thing were left to Nature. Counter-irritation is useful in most cases of asthma. The form I prefer is the ordinary croton oil liniment, if it can be borne by the patient; it seldom fails to relieve, and its effects last for some time. An ordinary mustard poultice will always give more or less relief, and it has the advantage of having no drawbacks. In reference to the vegetable anti-spasmodics, I am generally sparing of their use, especially lobelia, which I now never prescribe. Stramonium I use occasionally, but in small doses. They are all apt to upset digestion, and make the patient feel miserable and wretched. Euphorbia is a powerful remedy, but with most patients it causes a most unpleasant sensation about the region of the heart, which is distressing, and, to some people, very alarming. The nitrites I do not recommend, unless the dyspnœa is connected with heart lesion or uræmia. Their effect is very transient, and the same ends may be obtained by milder and more reliable agents. A hot bath will always relieve an asthmatic, but it is a cumbersome remedy, and very often not at hand when wanted. I have not found any of the medicinal baths to be of any decided value, and the cases reported from Continental bathing-places have more to do with the air of the locality than the bathing process through which the patient had to pass. Massage has little, if any, value in asthma. Electricity has some value, but it is very uncertain, and, unless there are special indications for its use, it is usually time wasted to trouble the patient with its application. I am bound to say, however, that I expect better things of this wonderful therapeutic agent, and I am of opinion that, when we have discovered more about its uses in medicine, and the best methods to apply it, greater results may be accomplished by it.

A Case of Aneurism, with Rupture into the Pericardium.

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I TRUST the following short outline of a case that recently came under my care will prove interesting :—1st, as showing the difficulty which we occasionally encounter in detecting aneurism of the aorta during life; 2nd, as showing the method which nature adopts to prolong life; 3rd, as showing the effects of congestion of the brain caused by obstruction of the veins.

E. Parker, aged 53, male, carpenter, was visited by me six months before his death. He gave me the following history: He came of a healthy family, was healthy himself until about twenty years ago. He began to feel weaker then, and was always tired. This tired feeling has been getting worse since. He does not remember having had any severe illness. He does not remember having ever been seriously hurt. He had to carry heavy planks of timber frequently. He usually carried them on his shoulder. When he began to have the feeling of being always tired his appetite failed slightly, but not much, otherwise he continued in fair health. His health has been fairly good since, but he continues to grow weaker and more lethargic. He has not been subject to cough or shortness of breath. He is not subject to headaches. He has not noticed any pain or fulness in the stomach after food.

Present Condition.—Body fairly nourished. Skin pale, with a sallow tinge. Pupils normal or slightly dilated, responding rather slowly to light. Tongue clean, fauces natural. Pulse 67, natural. Breathing natural. Examined chest and detected nothing abnormal. Abdominal organs all appeared healthy on examination. Urine sp. gr. 1030, no albumen. Abdomen retracted or boat-shaped. There was no pronounced anæsthesia detected anywhere, but there appeared to be unusual slowness in perceiving impressions. I could detect no noticeable departure from the healthy condition in the knee and ankle reflexes. The patient complained of pain over the region of the spleen, and under the point of the right scapula. He lay in bed continually, and had an aversion to being disturbed. He told me he did not sleep more than eight or nine hours at most, but his wife asserted that he slept at least twenty-three hours out of the twenty-four. He lay in bed apparently asleep day and night, except when he ate, which he seldom did more than once a day, and then sparingly. I was unable to make a diagnosis. I heard no more of the case until I was requested to assist Dr. Richardson in making a *post mortem* on the body. It appeared that Parker had gone out to defecate, and died suddenly before he could return to the house.

The following notes were taken at the *post mortem*:—Body fairly nourished. Skin blanched. No noticeable scars on the body. No want of symmetry or marked deformity of any part of body. On opening the thorax we found the sternum adherent to a large mediastinal tumour, which subsequently proved to be an aneurism. The pericardium was filled almost to the point of bursting. The lungs were healthy and natural in appearance. On opening the pericardium we found it filled with blood. When this was removed we discovered a rent by which a communication with an aneurismal tumour was established. The tumour commenced a little above the aortic valves, and occupied all the arch of the aorta. It was difficult to ascertain its exact relations to the neighbouring parts, as these were much displaced, and so matted together by inflammation and its results that it was almost impossible to define them. The pulmonary artery was

almost surrounded by the tumour, but there was no communication between them. The great veins were so displaced, and involved in a mass of matted tissues, that we found it impossible to ascertain how far they were obstructed by the pressure of the tumour. On examining the tumour from the inside we found the openings into the innominate, left common carotid, and left subclavian arteries much larger than natural. There was a softened patch where the tumour rested against the sternum. We tested the aortic valves and found them competent. The heart was healthy and empty. On opening the cranium a large amount of fluid escaped. The dura mater was very thick, and its vessels much dilated. In the tentorium cerebelli we found a piece of bone. (It was presented to the Museum.) There was intense venous congestion. The pia mater was also greatly thickened and congested. The brain was so much softened that it was difficult to remove it whole. The ventricles contained much fluid, but the exact amount was not ascertained. On making sections of the brain its substance was found greatly softened, much of it being easily washed away by a stream of water. The cerebellum was also softened from the effects of venous congestion. The spinal cord was not examined. In the abdominal cavity there was little that was noteworthy, except that the stomach was so contracted that it was little greater in circumference than the small intestine, and not so great as the large intestine, and all the organs were somewhat congested. The liver and spleen were not enlarged, and the kidneys were healthy, although very unequal in size.

No degeneration of the vessels was noted anywhere, and we met with nothing that would indicate a syphilitic history. I particularly examined the inguinal glands for enlargement or induration, and the penis for scars, but could find none. Dr. Richardson, who has been doctor to the family for fifteen years, did not know of any syphilitic history.

This, gentlemen, is a very brief outline of this case. The points which I desire should be specially noted are:—

- 1st. That the case must have begun a very long time ago, for the change in the disposition of the patient was noticed about twenty years before his death, and as this was probably the result of cerebral congestion, which in its turn was secondary to venous obstruction, caused by the pressure of the tumour, it is very probable that the swelling of the artery must have commenced more than twenty years ago.
- 2nd. It was not secondary to syphilis, kidney disease, calcareous degeneration of the vessels or any of the recognised causes of aortic aneurism, and it must have begun when he was comparatively a young man.
- 3rd. It was very difficult to detect it during life. There was no murmur and no abnormal dulness was noted, probably because the tumour was placed behind the sternum, and it was separated from the other parts of the front of the chest by lung-tissue, and most of the usual signs of aneurism were absent.
- 4th. It affords an excellent illustration of the effects of long-standing cerebral congestion from obstruction of veins.
- 5th. It shows how long such cases may continue to live when the patient remains absolutely at rest.

With reference to this last point I may mention that Parker would probably have lived longer only that absolute poverty forced him to try and do a little light work, which he commenced about a week before his death.

I do not, Mr. President and gentlemen, intend to trespass further upon your patience at present, but I trust that I may be able at the end of the discussion to supply any omissions which have occurred in the paper.

Some Points in connection with Small-pox.

JAMES STRUTHIERS, M.D., ABER.

As medical officer in two London small-pox hospitals I had the opportunity of making notes on many interesting points in small-pox, some of which I shall now try to bring before you. To avoid prolixity, I shall try rather to give a few of the conclusions arrived at, omitting on this occasion the data (in all cases observations of my own, noted at the time by the patients' bedside or in the *post-mortem* room) on which they are based. First, as to the true length of the initial stage, or period between the commencement of symptoms and the appearance of poeks.

Classing the cases together, an analysis of 600 gives the following averages :—

Duration of Initial Stage.

One day	...	...	...	...	16 per cent.
Two days	...	...	...	...	30 „
Three days	...	...	...	...	35 „
Four days	...	...	...	...	10 „
Five days	...	...	...	...	5 „
Six days	...	...	...	...	2 „

But if we compare fatal with non-fatal cases the average is somewhat altered; thus :—

Fatal Cases (108).

Two days	...	...	...	...	31 per cent.
Three days	...	...	...	...	30 „

Non-Fatal Cases (492).

Two days	...	...	...	...	29 per cent.
Three days	...	...	...	...	36 „

And, further, if we estimate the length of this stage in the case of children under 11 years of age, we find it to be :—

Under two days	...	...	...	...	20 per cent.
Two days	...	...	...	...	32 „
Three days	...	...	...	...	23 „

And still more is this stage shortened in the case of children under 11 with fatal small-pox, for of these 76 per cent. have an initial period of two days, or less.

In describing a typical case of small-pox, however, as the first table shows, the eruption should be set down as beginning on the fourth, not on the third day.

Prognostically, a long initial stage in a child is really a distinctly favourable sign.

SYMPTOMS OF THE INITIAL STAGE.

Turning to the symptoms of this period, I wish to call attention to a distinct error that has crept into one at least of our leading text-books on medicine—that is, that a sweating skin is not usual in the initial stage. I

have never once seen the skin dry and harsh, and marked perspirations are very frequently noticed by the patients. They were so in nineteen cases out of twenty-eight closely interrogated on this point.

A still more important point is the fallacy of classing sore throat as a symptom of the initial stage. Emphatically, it is not. Excluding coincident catarrhs, sore throat appears with, and is due to, the commencing eruption of pocks. Sometimes on the skin a slight preliminary stiffness or itching occurs an hour or two before a copious eruption. Thus, similarly, an uncomfortable feeling in the throat will occasionally herald the development of pocks there. But, normally, the absence of sore throat is actually an aid to diagnosis, specially from scarlet-fever and syphilis. Finally, it may be remarked that a severe initial stage is so common in mild variola that it is not prognostic, but a mild initial stage is so very rarely followed by a severe attack that it is of value in this regard.

Initial Rashes.

But little space need be devoted to these, because, although either most helpful or most misleading, according as the diagnostician knows them or not, they are rare. Disregarding for the present Hebra Junior's view, that a case with initial rash is an abortive hæmorrhagic case, we shall define an initial rash as one that appears during the initial stage, and fades as the pocks develop.

Initial rashes appear in perhaps 5 per cent of small-pox cases. They may be regarded as being of three different types, viz.:—(A) a kind of rash, the characters of which are so striking and so constant as to suggest the name, "The Diagnostic Initial Rash"; (B) another type, which, though not so far as I know definitely described among initial rashes, ought certainly to be so; (C) the third type, embracing all other rashes that may appear in the initial stage of the disease, and which are in most instances fleeting roseolar or erythematous developments. The rashes of this third kind present no characters peculiar to small-pox. There is considerable variety among them, but only in points that have no evident significance, so that it is unnecessary here to give an immense list of all the out-of-the-way curiosities they present. Their rarity is such that the total number of instances in which they appear is less than that in which the rash of either type A or of type B appears. A knowledge of the fact that they occur is sufficient to assist in preventing errors of diagnosis.

Class A: The Diagnostic Initial Rash.—The form of this rash is very peculiar, but the distribution is still more striking and constant. In a well-marked case it is seen to consist of two elements—first, a basic redness, on which, as a ground, there appear, secondly, innumerable small petechiæ of a darker red or of a purple red colour. The petechiæ vary in size. Generally they are 1-24th of an inch in diameter, but they may be merely scarcely measureable specks. Their margins are neither sharply defined nor ill defined; that is to say, that whilst they do not present the distinct edge seen in certain black oval petechiæ in hæmorrhagic cases, yet their margin does not fade so gradually but that they can be fairly measured. The rash is distributed chiefly on the groins, but almost as often on the anterior and posterior axillary folds, and no matter how widely the rash may extend, these are seen at a glance to be the parts where the basic redness is deepest and the petechiæ most numerous.

- (1) In a very slight example there will be perhaps nothing but a patch of redness, speckled as described, and with its long axis generally parallel to Poupart's ligament.

- (2) In a very well-marked example, when fully developed, there will be, about the groins and angles of the axillæ, not only marked ground redness, but streaks and patches of purple, resulting from coalescence of the extraordinarily numerous petechiæ. (Such cases have often been mistaken for hæmorrhagic cases.) The ground redness at these sites will extend some inches in all directions, and enormous numbers of petechiæ will be seen to extend for some distance beyond the redness. A broad band, similarly composed of redness beset with petechiæ, and petechiæ alone, may be found crossing the back, about the iliac crest level. Even the whole trunk may be speckled with the petechiæ, far more thickly near the groins and axillæ, but this is rare. Patches of petechiæ alone, or of both basic redness and petechiæ, may be found on one or both elbow and popliteal hollows, and also, curiously enough, where a low collar touches the free rounded edge of the cervical trapezius. Finally, purple-red specks may be scattered up and down the limbs.

Between these two extremes (1 and 2) all intermediate forms are found, varying more or less in detail. Once seen, the rash is unmistakable. It may be fully out one or more days before the pocks appear. As the pocks develop the petechiæ quickly fade, and in a few days are gone. The basic redness gets brownish and finally yellow, and traces may persist even two weeks or more.

Of nineteen such cases in 1884 not one died, and most were very moderately ill.

Class B: The Black Initial Rash.—Before describing this form, a word must be said as to its resemblance to another rash occurring under different circumstances and behaving differently. In hæmorrhagic small-pox*, a very definite and rather common phenomenon is the appearance of numerous small spots of extremely dark colour, generally well defined—sometimes sharply so. They are termed, “purpuric,” “purple,” “blue-black,” “black,” “ink-spot,” &c. They are often about the size of a split-pea or less, and are oval or round. This purpuric spot has come to be associated with hæmorrhagic small-pox alone. Hence the detection of such a spot is regarded, and regarded quite rightly in the majority of instances, as a sign of fatal import. But a few or even a few dozen spots of this description, of smaller size, occursometimes as an initial rash. A patient with severe small-pox may be occasionally seen without any single sign of hæmorrhage, but on whose back, chest, or limbs, a few black spots, a line or less in breadth, may be found. And these spots fade as the pocks develop like other initial petechiæ. In most of the writer’s cases they were few in number; only three or four sometimes, and the back was their commonest site. Children seemed to present them most often, and they were of very grave prognostic import. The cases are generally fatal, but may run an entirely unhæmorrhagic course, and sometimes end in recovery. Therefore a black spot is not always to be regarded as a certain sign of death. Before leaving rashes A and B, it may be added that sometimes, but very rarely, a combination of petechiæ, like those of A, with more or fewer of the black petechiæ of B, is seen. These are also very bad cases.

Class C: Erythematous Initial Rashes.—The commonest of these is a more or less generally diffused red blush (often brought out by a hot bath), or a patchy redness of a temporary character, with variable distribution.

* By hæmorrhagic small-pox is meant not necessarily pure hæmorrhagic small-pox, but small-pox in which skin hæmorrhages form a decided feature of the case.

The redness is not composed of minute red points aggregated. If patchy, the patches are not dusky red like measles, nor are the patches distributed like measles. They disappear at any time, before or after the appearance of the pocks, and leave no pigmentation nor trace behind. Sometimes there is a rash of well-formed macules—*e. g.*, on the wrists and anterior ankle-surface. Sometimes it is erythema circinatum. One case had confluent red blush on the hands, passing up the ulnar surface of the arm in a mottled form, and found also mottled on the feet. Another had very numerous red macules the size of a split-pea all over the abdomen, with no basic redness, no aggregation anywhere, and of a faint colour. And so on, examples might be multiplied. Such rashes are very rare, unless, perhaps, the universal fleeting blush after a hot bath may occur oftener than the writer knows.

No prognostic significance attaches to them to the writer's knowledge.

Before leaving the subject of initial rashes it would be well to lay emphasis on a very common error. "Measly initial rash," or "an initial rash just like rōtheln," are expressions often used. The writer kept a careful look out for such a rash, and failed entirely to find one. But the explanation is simple. In a certain form of commencing small-pox the eruption proper simulates measles so very exactly as to be at times quite impossible to diagnose with positiveness. In such cases, which are very severe, the initial symptoms sometimes have not disappeared, and hence the eruption is either mistaken for, or else is loosely termed, initial.

The strange distribution so carefully described, *viz.*, along the extensor tendons of the great toe, I have seen only once, and the initial rashes seen by me showed no very marked preference for that site.

REMISSION OF SYMPTOMS ON APPEARANCE OF POCKS.

This remission is sometimes almost entire. In mild cases the sufferings of the patient often end with the development of the pocks. Even in severe cases the remission is generally quite extraordinary, and, unfortunately, often leads the patient to imagine his troubles at an end. Two exceptions may be mentioned. Where the hæmorrhagic element is marked there is a change only, not a remission, of symptoms. And, in a certain type of modified cases (well known to experienced nurses), whose faces are early swelled to a great extent, although the pocks are comparatively few, there is little remission, and, subsequently, hardly any "secondary fever." This remission of symptoms is a cause of the spread of small-pox. Dr. Clark, at Homerton small-pox hospital in London, collected, in six months, notes of 1,000 persons who had gone out walking in the streets just after the pocks developed. Observe that Ziemssen's remark that a typhoid patient walks and a small-pox patient is carried into hospital, does not usually apply after the eruption has developed.

THE SO-CALLED MACULAR STAGE.

Practically this does not exist. Observing that I had never noticed any patient in this "stage," I began to keep a special look out for its appearance. Only in one or two cases, and in these in the case of a very few pocks alone, could I ever make out that a pock appeared first as a macule. In no single patient was it ever general, unless the measly blotches that form the early stage of a certain severe partly hæmorrhagic type of eruption be referred to as macules. And if it is true that microscopically the first event in the growth of a pock is a swelling of the cells of the malpighian layer, it will be

seen that a papule is necessarily the first manifestation. The "macular stage" ought to be excluded altogether in descriptions of the typical course of the eruption.

"MODIFICATION" IN SMALL-POX.

The word "modified" has been used to cover any unusual case of small-pox; but great advantage would result from strictly confining the term to cases whose course is interfered with by vaccination or previous small-pox. I wish to lay emphasis on this, as ready recognition of vaccination influence stepping in is essential to prognosis. When we see an unvaccinated person with so many commencing papules, we have, after experience, a very accurate idea of how that person will fare. The pocks in such a case run a very regular course, be they few or be they many. The papule grows very steadily and gradually larger and fuller, becomes pale, waxy red, then, as the days go on, dull white; and, if the pocks are discrete so as not to interfere with each other, general crustation on the face is deferred to the eighth or ninth day of eruption. In confluent cases an equal regularity, that becomes familiar by experience, is found.

Now, in vaccinated persons the pocks may run this regular course, or they may not. If they do, the case is "unmodified." "Modification" then may advantageously be confined to the interruption of the regular development of the pock.

The forms of this interruption are deeply interesting, and acquaintance with them of high practical value. Generally speaking, there are three chief ways of modification. First, vaccination may influence the disease from the beginning, making the initial stage mild, and either preventing eruption altogether, or rendering it trifling. Sometimes a single papule on the wrist or ball of the thumb may represent the eruption. Or there may be scattered irregularly a few soft red papules, chiefly about the back and chest, provided there often with haloes. Such papules often die away without even becoming vesicles, or they may show a little "fester head" and soon disappear. Secondly, vaccination may have no effect on the initial stage, but may entirely change the eruption by producing a proportioned shortening of each of the stages papule, vesicle, and pustule. In such cases there is very often immense swelling of the face and hands—greater, indeed, than occurs in severe unmodified small-pox, and out of all proportion to the number of the pocks. This swelling, too, may begin with the papular stage, whereas, in unmodified cases, swelling develops *pari passu* with the pocks. In such a case one might see a two days' papular, two days' vesicular, and two days' pustular stage, crustation thus coming on much earlier. Thirdly, and very commonly, vaccination may allow a case to go on regularly, exactly as if unmodified, up to any day, and then suddenly step in and cut the latter stage or stages quite short, thus aborting the case at the papular, vesicular, or early pustular period. It is most striking to see, as I have seen, two patients lie side by side, the one vaccinated and the other not, both with terribly severe initial stage and extraordinarily numerous pocks, and to see these pocks progress similarly for two or more days, and thereafter, in the vaccinated case, a sudden and most marvellous change occur. In the instance of two such patients now in my mind, on the third day of the eruption they were both still in the papular stage, and, seemingly, equally ill. Next day the papules on the vaccinated man were crowned with either little white tops or little brown crusts—that is, the vesicular and pustular stages were rushed through in a fashion within twenty-four hours.

Hardly any change had occurred in the other case, and the eruption slowly and regularly led to death. This vaccination effect may appear even too late, altering the eruption after the patient has sunk too low to recover, so that I can confirm the remark in one of the books that the influence of vaccination may be sometimes seen even in fatal cases. White liquid or pus found early in pocks is a very reliable sign of modification.

THE COLOUR OF POCKS.

The dead-white colour assumed by pocks in the so-called pustular stage is not due to the presence of pus inside them. Easily the roof of the pock may be removed and seen to be of this colour, probably from death of the epidermis, whilst the contents of the pock are only cloudy amber in tint. Real cream or white pus is a rarity in the pocks. In late stages, when most pocks are crushed, some on the face will show it; but it is interesting to note that, while the great mass of pocks are of a dull white, with inflamed bases, and the "pustular" stage is well advanced, the pock-contents are nearly all only cloudy-amber coloured.

CENTRAL DEPRESSIONS.

The theory that central depressions are caused by a hair-follicle or a sweat-gland pinning down the centre of a pock can be exploded without going to German or French microscopists. The central depressions can be seen on the glans penis, on the mucous membrane of the buccal cavity, and elsewhere where neither hair-follicles nor sweat-glands exist; and, in a case with very many pocks on the chin and cheeks, hairs may be seen passing through the very centre of undepressed pocks, pocks may be seen well depressed without hairs, and in fact such relations of hairs and pocks observed as will convince anyone that some other explanation is to be sought. The current view abroad is that a different cell-change of a more intense character occurs in the centre of the pock—a molecular necrosis centrally, a vacuolar alteration peripherally. But a great error that seems to be prevalent is that central depressions are essential at all. In the face there are generally more pocks without central depressions than with them. An erroneous idea also prevails that the centre is depressed from the beginning. I have not time now to give a detailed account of central depressions, and shall leave this part of my subject by saying that well-marked and numerous early central depressions indicate generally a very bad case.

NOMENCLATURE OF SMALL-POX.

There is much to say about the unsuitability of the names in common use, but space forbids my doing more now than pointing out that, since according to the number of face-pocks, confluence may take place in the papular, vesicular, or pustular stage, it is of little value to call a case confluent, or semi-confluent, without adding at which stage that confluence or semi-confluence occurred. Papules vary from $\frac{1}{50}$ in. in diameter (at their *bases*) upwards, and grow as they develop into pustules until their bases measure $\frac{1}{10}$ to $\frac{1}{4}$ in. About a score of papules to the square inch of skin (on the face) means in an unmodified case, severe confluence in the vesicular stage. As there may be several score of papules to a square inch on the forehead, the difference between one confluent case and another may be imagined.

As this paper is already of undue length, I must omit reference to several extremely interesting matters I wished to bring before you, and conclude by mentioning, as shortly as I possibly can, one or two special peculiarities of small-pox.

First, as to the distribution of internal hæmorrhages in hæmorrhagic small-pox. There are three favourite sites for these. 1st. The fat-bed of the kidney, and, strange to say, the wall of the ureter and pelvis of the kidney. Even when the urine is comparatively free from blood, the tissue of the wall of the kidney pelvis may be black through and through. The kidney itself is left free. 2nd. The mucous membrane of the stomach, a few inches of the upper duodenum, and then missing the whole length of jejunum and ileum, the cæcum, colon and rectum. In the stomach various combinations of black and red spots and streaks form strange and picturesque patterns. 3rd. The visceral pericardium, the muscle of the heart, and the endocardium, and, in very severe cases, the tissue round many of the great vessels show copious hæmorrhagic infiltrations.

A point (among many) of some use in diagnosing small-pox from chicken-pox is that when the vesicular stage is reached small-pox pocks may be seen to have distinctly sloping sides. They are cones. In chicken-pox the vesicles are generally small hemispheres. It is only in the latest stage of small-pox, when the majority of the pocks are crusted, that some of the pocks may be found standing up with vertical sides as if stuck on to the skin instead of growing from it.

The writer has noticed, in piercing many hundreds of pocks at all stages to examine the liquid exuding or the structure of the pock, that variolous papules, even the very minute ones, may be pierced with a fine needle without ever drawing blood. They are, of course, epidermic. If, then, in a case of doubtful illness with papules, these papules on being transfixed bleed, the disease is not small-pox.

Chlorosis.

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For some years after commencing practice I felt there was something about the treatment of chlorosis which had eluded my grasp, consequently I read all books and articles available on the subject, until in 1875, when reading an article by Dr. Robert Barnes, in his "Clinical History of the Diseases of Women," I found what had been so long the object of my search, and as the suggestions there made seem to me to have been forgotten, or, at least, to be not generally acted upon, or mentioned in the recent literature on the subject, I hoped to be doing a service by laying before you a short sketch of the treatment recommended by modern authorities, including that which I had found useful in most of my cases during the past seventeen years.

This treatment may be considered under the following heads:—Prophylaxis, hygiene including the question of rest, diet, and drugs.

1. Prophylaxis requires that means should be taken from earliest infancy to keep the child in the best possible state of health—to make her ready, so to speak, to meet the demands of puberty.
2. The hygiene consists in securing the patient as much light—direct sunlight—and fresh air as possible. Try to ascertain the exciting cause with a view to obviate it if it can be done; if not, an attempt may be made to break up present associations, by suggesting a change of air. Recommend a tepid sponge bath in the morning (it promotes tissue metabolism and the action of the skin), to clothe warmly and loosely, and to lead a regular, occupied, and purposive life. As to rest, Dr. S. Mackenzie says—"In severe cases, absolute rest is imperative; in less severe cases, longer hours than usual in bed, and the recumbent position for some hours a day, to save the enfeebled heart is necessary; and when the strength permits, gentle exercise in the open air, as driving, is important." Sir Dyce Duckworth says—"Rest in the early treatment of severe cases is urgently called for, when there is cardiac debility and dilation, also if there be a suspicion of gastric ulcer"; and Dr. Goodhart advises absolute rest in bed for from ten days to three weeks, and not much exercise of any kind for three weeks longer.
3. Diet.—The great demand for nutritive material must be duly considered and the food carefully ordered, so that it shall not only supply the albuminous elements, but be retained and absorbed. As a rule chlorotics prefer non-nitrogenous food and tea without milk. Milk, eggs, and meat are the three essentials. Sir A. Clark's typical dietary consists largely of these; Dr. Goodhart says—"They must be fed with good wholesome food—four meals a day—beginning with milk and egg; good meat and vegetables can soon be added, and each meal should see some addition, until a reasonable quantity is taken." Sir Dyce Duckworth says—"One approved plan of treatment consists in giving saline aperients, together with good diet, and some full-bodied red wine, such as Burgundy, to the extent of 4 to 6 ounces daily; and if there be any pain after solid food, suspect gastric ulcer, and employ suitable diet for some time."

4. Drugs.—“Iron is a specific, but must be given persistently.” *Niemeyer* says—“A very common error in the treatment of this affection consists in the attempt to relieve the crethism, digestive disturbance, and other troubles due to the state of the blood; while iron . . . is neglected. Such preparatory treatment almost always retards the recovery unnecessarily.” Again, “the efficacy of Blaud’s pills cannot be surpassed, simply because they can be administered in very large doses without distressing the patient”; and again, “we shall cure chlorosis most speedily and surely by means of those ferrugineous preparations which can be tolerated in the largest doses.” Dr. Barnes says:—“It is accepted as an axiom in medicine that, the blood being deficient in red globules, iron is the remedy *par excellence*.” Such were the ideas I was imbued with, tried to act upon, and felt dissatisfied with, until I read further, where Dr. Barnes says—“Long clinical experience has taught me the *general law*, that in all stages of blood degradation, whether resulting from mal-nutrition, from wasting diseases, or from hæmorrhages, *iron is ill-tolerated at the beginning*. In all extreme anæmic states the *febrile irritability* is liable to be aggravated by iron; the tongue gets parched and brown, indicating a like state throughout the alimentary canal, inducing constipation, and generally impeding nutrition; violent headache ensues; the pulse rises in frequency. The true indication is, first, to allay the vascular irritability; this is best done by *salines*, of which the best is the fresh prepared acetate of ammonia. So marked is the benefit that one cannot resist the conclusion that the *blood is in want of salines* as well as of iron, and that the saline material is the first want.”

“When *vascular irritability* is subdued, when the secreting organs have been brought to a clean and healthier state by salines and aperients, iron may be cautiously tried,” and Dr. Barnes mentions Griffiths’ mixture, citrate of iron and ammonia, and solution of the acetate as all good.

Drs. Hart and Barbour recommend Blaud’s pills three thrice daily for six to eight weeks, but add, “Before the pills are given the state of the tongue and bowels should be looked to. If the tongue is foul and the bowels constipated we may give magnes. sulph., quininæ sulph. with dilute sulphuric acid for a week. The hint as to preliminary purgation is a good one, and is given by Milner Fothergill; if not attended to, the result will be disappointing, as the iron will not be so readily absorbed by the intestinal mucous membrane.”

Dr. Mitchell Bruce directs “to bring the alimentary tract and organs of sanguification into a healthy state.” And adds, “dyspepsia and constipation require treatment, and for this purpose simple alkaline and bitter stomachics, with rhubarb and free purgation by ordinary means, followed by a course of aloe and iron pills at night, are the best.”

Sir Andrew Clarke prescribes ferri. sulph., magnes. sulph. with dilute sulphuric acid, and adds, “occasionally this produces sickness, dries the skin, and is otherwise ill borne.” In such cases he prescribes ferri. sulph. with sulphate and carbonate of sodium, and when this disagrees, ferri. sulph. in pills with meals and a saline aperient in the morning.

Sir Dyce Duckworth says—“Saline purgatives probably answer better for cases of amenorrhœa dependent on plethora,” and “some cases of chlorosis may be cured by aloe alone without iron.” “Constipation is

well treated by aloes, which operates on the large bowel, relieves intestinal catarrh, and stimulates adjacent pelvic viscera, encouraging thereby restoration of function to the uterus and ovaries, and thus establishing the menses. The state of the digestive system sometimes forbids the immediate use of iron. Thus it will hardly agree unless the tongue be clean and any catarrhal state of the stomach be first removed." For this purpose he recommends soda and calumba mixture for a few days; then iron, *beginning with small* and increasing to large doses. At first 5 to 20 grains thrice daily of the ammonio-citrate, tartrate, or saccharated carbonate; and finally half-drachm doses of the saccharated carbonate spread on bread and butter. The dried sulphate is also good given in 20- to 30-grain doses in pills with potash or soda. Clinical evidence shows that these large doses effect what smaller doses fail to do. To secure full benefit, it is necessary to keep the patient under observation from time to time for one or two years, and to recur to the treatment for a few weeks at intervals; there is a great tendency to relapse, and the risk is of leaving cases incompletely cured, and so still exposed to the grave evils attendant on the anæmic state. During the treatment by iron it is well to give a nightly dose of decoct. aloes co. made stronger by the addition of 1 to 2 drachms of tincture of aloes if necessary.

Dr. Goodhart reminds us that mist. ferri. co. only contains the equivalent of $2\frac{1}{2}$ grains of sulphate of iron, and advises the saccharated carbonate, or reduced iron, in half-drachm doses, or more, three times a day over a course of six weeks, to be given in powder, lozenges, or pills (made up with glycerine of tragacanth and coated with some soluble coating). At the first indication of a relapse they must return to their remedy for a short course of three weeks or so.

Dr. S. Mackenzie remarks — "It is exceedingly rare for patients to be unable to take iron in some form when it is really needed; when there is much gastric disturbance this must be treated *at the same time, but is no bar to the administration of iron*. When the tongue is coated, flabby, and indurated by the teeth, it is my practice to give an alkali and bitter mixture between meals, and iron in pills immediately after or with food. We may combine the iron with the citrate or bicarbonate of potash, and give the two together, but it is not in this way so convenient to regulate and *augment* the dose of iron. When constipation co-exists, I give a drachm each of sulphate of sodium and magnesium (with or without a drachm of chloride of sodium) in half a tumbler of *warm* water in the morning on rising."

My usual practice is to give tinct. ferri. perchlor., 3 ii—vi; liq. ammon. acetat., 3 iv—ii; glycerinæ, 3 i; aquæ. ad. 3 viii; a tablespoonful after meals in water; the iron in small doses at first, gradually increased, the liq. ammon. acetat. in an inverse manner, and at the same time ferri. redacti., 3 s—3 ii; pil. aloes et myrrhæ, 3 s—3 i; in 12 pills, one to be taken at first night and morning if necessary, afterwards at night only. In any case in which the tongue looks very foul and the patient complains of nausea or sickness, I give sodii vel. potas. bicarb., 3 iii; ferri. ct. ammon. cit., 3 i—ii; liq. ammon. acetat., 3 iii; tinct. chlorof. co., 3 ii. Infus. calumbæ ad., 3 viii, a tablespoonful in water three times a day first, for a bottle or two, and then put her on the tincture of iron mixture. Improvement generally begins at once; the patient not only looks better, but often remarks—"I feel comfortably warm now." The skin becomes moist, and the headache less frequent and severe. As soon as the iron is given in moderately large doses the bowels act satisfactorily without any aperient. In some cases I find the iron sits lighter on the stomach when taken in warm water.

How does the iron act? (1) In the stomach and intestine, if not given in these forms, it becomes converted into a chloride or albuminate. Part is absorbed and acts on the blood, and it is probable that much that is absorbed into the portal vein returns to the intestine with the bile. It soon becomes incorporated with the red corpuscles, as it cannot be detected in the plasma, elsewhere than in the portal system. Its immediate effect is to increase the number of corpuscles, to stimulate the production of new or young corpuscles, and only secondarily does it add to the amount of hæmoglobin in the corpuscles. The iron treatment should be persevered in for some time *after* the patient feels herself well and has a good colour, as the hæmoglobin increases regularly, but it is difficult and takes time to bring it above 85 per cent. of the normal. The vascular sounds should also have vanished and menstruation returned before the treatment is given up. (2) Its good effects are also said to be due to its local tonic action on the gastro-intestinal tract. Small doses usually have an astringent action, but larger doses seem to stimulate peristalsis.

When the tongue is pale and flabby, astringent preparations are to be preferred. Dr. Grainger Stewart says—"The dyspepsia and hepatic congestion occasionally attending the use of the tincture of iron in large doses may be best alleviated by adding 1 grain of the chloride of ammonium to each minim."

Where neuralgia, as the infra-mammary pain or headache, is severe, arsenic iodide, or bromide of potash, might be usefully combined with the iron mixture, and local heat applied. In the later stages of treatment the addition of small doses of strychnine adds to the efficacy of the iron, and imparts tone to the nervous system and heart.

Dr. Wade, of Birmingham, calls attention to some cases in which special features occur. In one it was rapidity of the heart's action, and deficiency of arterial tension; here belladonna acted well. In another case the special feature was chronic gastric catarrh; here ipecacuanha was followed by immediate and progressive improvement. I remember another case, complicated with dyspeptic ulcers all over the mouth, in which progress was unsatisfactory until I gave maltine with carbonate of iron.

Marriage has been recommended as a means of curing chlorosis. On this point Drs. Cazeaux and Tarnier say—"When this disease appears to have been produced by *disappointed love*, the cause may indeed be thus removed, and the remedies directed against it rendered more efficacious. Under all other circumstances, however, pregnancy has seemed to me to aggravate the chlorotic symptoms. I therefore think it most prudent to defer marriage until after the general health of the patient is improved."

Notes on the Occurrence of *Anchylostomum Duodenale* in Queensland.

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WE publish the following notes, not because *Anchylostomum Duodenale* is rare as a cause of anæmia, but because we think that its existence as a perhaps pretty frequent cause of anæmia in Northern Queensland has been overlooked, and because our cases lead us to support the opinion that its presence can be demonstrated by means of its ova with very great ease.

In March, 1892, two sisters, suffering apparently from profound anæmia, were admitted, under the care of Dr. Lockhart Gibson, into the Brisbane Hospital for Sick Children. They came from Cairns.

The elder, aged 4 years and 3 months, had a history of having been strong and healthy until about six months previous to admission, and that her face had been of a brown and healthy colour until that time. She is said to have then had an attack of "Colonial Fever," which lasted for about a fortnight, after which she grew pale, and developed an appetite for sand, dirt, and cinders; became tired and languid, restless at night, complained of occasional abdominal pains, and suffered from constipation, developed a habit of picking her nose and of biting her nails; has been given worm-powders, but has passed no worms.

The younger sister, aged 2 years and 3 months, appears to have been attacked in the same way at an even earlier date. She had a history of having been a fine, healthy child until weaned at 12 months of age; had been given plenty of good goat's milk, together with other food after weaning. Four or five months later she lost flesh and grew pale; she had walked at 10 months, and has been of a lively disposition. During the twelve months previous to admission she had been in the habit of eating all the dirt, sand, and clay she could get; she is stated to have never passed any worms; appetite said to have been poor of late.

On admission both were extremely anæmic; their skin had a greenish-yellow tinge; their lips and mucous membranes were blanched; they were well nourished and plump, and showed no œdema, no enlargement of the spleen. Faint hæmic bruits were heard over the præ-cordia in each case.

Our provisional diagnosis from the first was *anchylostomum duodenale*. The fæces were searched for evidence to support such a diagnosis, and have constantly yielded very numerous specimens of ova, answering, we believe, to the descriptions of the ova of *anchylostomum duodenale*. These ova are oval, having much the shape that a hen's egg would have if both ends possessed the same curvature as the *thicker end*. They have a very distinct envelope, present no flat side, as do those of *oxyuris*, and never contain a fully-developed embryo, as do the latter almost invariably,—otherwise they resemble the *oxyuris* ova in size and shape, being, however, broader and with blunter extremities. Using the above comparison, the ova of *oxyuris*

could be better compared to a hen's egg with ends possessed of the same curvature as the *thinner end*. The contents of the cell envelope, rarely in our specimens, have filled it entirely, a distinct interval being generally recognisable between the envelope and its cell contents, sometimes throughout its whole extent. The cell contents have almost invariably been in process of segmentation, all stages of simple segmentation being noticed, as this diagram will show. When segmentation has not advanced beyond six or eight cells, a distinct nucleus, and generally also nucleolus, may be seen in the granular protoplasm of the daughter cells.

The latest edition of Fagge states that "discovery of the ova is the only way of distinguishing anæmia thus produced from other kinds of symptomatic anæmia, and from the severest form described by Addison as idiopathic." If such be granted, the diagnosis of *anchylostomum duodenale* as a cause of anæmia is perfectly simple. The ova are so numerous that a small piece of fæces has merely to be teased in a drop of the fluid part of the stool, placed under a microscope—perhaps first under a low power for a general view, and then under $\frac{1}{8}$ or $\frac{1}{4}$ inch objective—when ova, answering to the above description, will be present in every specimen. They measure $\frac{1}{25}$ mm. in length (Fagge).

The fæces of our cases are generally slightly clay-coloured, though very tarry stools have not been observed, and rouleaux of decolourised coloured corpuscles are often found under the microscope. Frequently blood and blood-stained mucous are distinguishable to the naked eye. This has generally been most marked when some dysenteric diarrhœa has been present.

In April, enumeration of the blood corpuscles gave for the elder child 2,300,000 hæmocytes, and 14,000 leucocytes to the c.m. of blood; for the younger child, 2,295,000 hæmocytes, 10,000 leucocytes.

The corpuscles, when examined in fresh specimens, have shown nothing abnormal; numerous colourless microcytes being, however, present, as in other cases of anæmia, in which efforts at blood regeneration are going on.

Treatment has been directed to evacuating the parasites and to improving the condition of the blood. Male fern, spigelia, and santonin, with calomel, have all failed, until the last week, to evacuate parasites. Protochloride of iron in large doses has been given pretty continuously, with at first slight and temporary lessening of the anæmia. The highest recorded estimation of hæmocytes being, for the elder, 3,530,000 per c.m. of blood. They relapsed, however, from this, and latterly arsenic in considerable doses has been added to the protochloride of iron, the elder child having been mounted up to nearly $\frac{1}{4}$ gr. of white arsenic a day, and the younger to nearly $\frac{1}{2}$ gr. a day. Under this combined treatment the elder has improved again somewhat, the last enumeration giving 3,300,000, and she has even developed a colour. The younger is as bad as ever—2,000,000.

They have become more lively and less peevish, but still have to be watched, or they will eat any rubbish they can lay hands upon. A peculiarity about both cases, but more especially the younger, is the fluctuating character of the anæmia. One week they appear to be progressing favourably as far as bloodlessness is concerned, though without any diminution in the number of evacuated ova; while the next week, without any apparent reason, they are as pale again as ever.

To increase the interest of these notes, Dr. Peter Bancroft has given us permission to mention a third example of this disease, which was admitted into the Sick Children's Hospital, under his care, June, 1892, with the following history:—

Girl, aged 5 years, left Mackay when 4 years of age, was then very pale, but otherwise appeared in good health. Lived in Gympie for twelve months, and was brought to Brisbane about Christmas, 1891. Has been often out of health for the last two months, suffering from attacks of diarrhœa and feverishness, sometimes peevish and complaining of pain in her head and in her knees. Her face swells sometimes. This case is of additional interest because of her brother, aged 9 years, having died in the Gympie Hospital after a two years' illness. He had been healthy until two years before his death, when he gradually grew pale, and for the last twelve months of his life was as white and bloodless, according to his parents, as his sister was on admission to our hospital, and, like her, he suffered from attacks of diarrhœa and feverishness. He is said to have become dropsical during the last week or two before death. The ova in the fæces of this little girl are as numerous as in the cases of the two sisters, and identical with them in appearance in every respect. Blood enumeration in her gave 2,600,000 hæmocytes and 20,000 leucocytes to a c.m. of blood. She was, therefore, not more anæmic than either of the sisters, but is thin as well, and very feeble and lethargic looking. Her stools are more uniformly clay-coloured, and contain, as a rule, more blood. She has suffered from an attack of dysenteric diarrhœa since admission, but is generally more inclined to be constipated. Her temperature is very irregular, varying from 97 degrees to 103 degrees, occasionally being nearly natural for days, and then becoming elevated for one or two days. The elder of the two sisters has had no diarrhœa since admission, and her motions are, as a rule, regular. Her temperature has generally been below 99, but during April was nearly 100 degrees, and once above 101 degrees. The younger of the two sisters has had several slight dysenteric diarrhœa attacks. Her temperature has been more irregular, often being above 99 degrees, seldom above 100 degrees, and only once reaching 103 degrees.

As far as we can gather, the only recorded case of *anchylostomum duodenale* in Australia was that by Dr. Hogg, then of Goodna, in the *Australasian Medical Gazette* of February, 1889. A male inmate of the Asylum for the Insane developed anæmia and a depraved appetite, preferring a diet of keys, nails, stones, &c. Dr. Hogg, in searching *post mortem* for a cause of the anæmia, found very numerous examples of *anchylostomum duodenale* in the duodenum and jejunum. These he, at the time, demonstrated at the Queensland Medical Society, and we are enabled to exhibit for him three examples of the male parasite and several of the female.

Dr. Hogg, in a letter to us, mentions that Dr. Cutfield, when Government Medical Officer at Mackay, had to deal with a very intractable form of anæmia affecting children in the Roman Catholic Orphanage there. After seeing Dr. Hogg's paper he believed that *anchylostomum duodenale* was the cause, but obtained no confirmatory evidence. The state of matters became so bad in the Orphanage that it was closed, and the children dispersed elsewhere.

During the last week we have been fortunate in causing evacuation of twelve examples of *anchylostomum duodenale* from our patients; our success rather pointing to aid having been obtained from the large doses of arsenic



b. Ova as passed in stool, seen under
a high power (Hutchins E 3. 6hj. 8)

given. It would almost appear that the arsenic had lowered the vitality of the parasites, and enabled santonin and calomel, which had previously failed to cause their evacuation, to be successful. The two sisters were given arsenic in gradually-increasing doses, and in the form of "Asiatic Pills" (Kaposi), beginning on July 22 with $\frac{1}{4}$ grain of white arsenic daily. The elder child had been mounted up to $\frac{1}{8}$ grain of white arsenic daily by August 30, and is still taking that dose. The younger child reached $\frac{1}{8}$ grain daily on August 23, and it was not discontinued until September 15, when two grains of santonin and calomel were given to each, followed by castor oil next morning. The stools of the elder child contained on the 16th eight examples of *anchylostomum duodenale*, all females, and varying from $\frac{1}{8}$ to $\frac{1}{2}$ inch in length. The stools of the younger contained none. Two grains of santonin without calomel were again given to each child on the evening of the 16th, followed by castor oil on the morning of the 17th. The stools of this day contained—of the elder child, one male and one female; of the younger child, two females from $\frac{1}{2}$ to $\frac{2}{3}$ inch in length. All were dead. To find them the stools have to be searched with extreme care, and preferably in small fluid quantities at a time, when the parasites, if present, will be recognised, against a suitable background, as spindle-shaped, rather stiff bodies of either an opaque white appearance or dark brown from contained blood. A $\frac{1}{4}$ -in. objective sets all doubt as to their nature at rest. The females under this are seen to possess a bluntly-pointed head and a sharp-pointed, rather stiff tail, while the males are recognised by their expanded and truncated caudal extremity, which appears to be divided in the larger examples, for instance in those shown by Dr. Hogg. The females are loaded with ova similar to those found by us in the stools of our patients. These ova are easily recognised when the body of the animal has not been made too opaque by ingested blood. In the recent specimens, as seen by Dr. Hogg *in situ*,* their bodies presented a pink appearance on account of contained blood. They are said "to fix themselves firmly by two pairs of teeth into the mucous membrane of the duodenum and jejunum, and within their mouths are two movable blades, which doubtless serve to incise the intestines."—(Fagge). In Quain's *Dictionary of Medicine*, an excellent diagram of these worms, by Cobbold, is to be found.

P.S.—Since this paper was read we have demonstrated the existence of disease due to *anchylostomum duodenale* in patients who have lived only in Southern Queensland.

* And since the above was written seen also *in situ* by ourselves in the case of an adult patient whose *post mortem* confirmed the diagnosis.

Snake-bite in Australia—Recent Statistics and a Review of Recent Observations.

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IF an apology be needed for bringing under the notice of this meeting the subject of snake-bite in Australia, a sufficient justification may, perhaps, be found in a perusal of the periodical medical literature during the four years which have elapsed since Dr. Augustus Mueller, of Yackandandah, in May, 1888, read before the Medical Society of Victoria a paper "On the action of Snake-poison and the use of Strychnine as an antidote." Since the publication of this paper not only has Dr. Mueller contributed numerous papers, but many letters and editorials on the subject have appeared in the *Australasian Medical Gazette*. A series of cases of snake-bite treated by various medical men throughout the Colonies, in most instances by the method proposed by Dr. Mueller (namely, hypodermic injection of the remedy), has been given in the same periodical. Through this journal various strong opinions, almost universally in support of this method of treatment, have been repeatedly expressed. The general public appear to be thoroughly seized with the idea of the curative action of strychnine in snake-bite, and the favourable issue which has been in the majority of cases recorded is very generally, and strenuously, attributed to the strychnine administered. A study of all that has thus been written led me to the conclusion that a great deal of that which was claimed by Dr. Mueller, and others, as to the efficacy of strychnine could be satisfactorily established or disproved only by massing together the results which have been obtained in actual practice, and by comparison of these aggregated results with those obtained by other methods of treatment. For though, on the one hand, as one perused record after record of reported recovery in cases in which Dr. Mueller's treatment had been adopted,—cases in which coma had been relieved, a failing pulse restored, and other extreme symptoms rapidly remedied,—one was undoubtedly impressed by the possibility of all this being due to the action of the drug; on the other hand, as one went further into the literature of the subject, and read of equally brilliant results in cases in which either other treatment or no treatment at all had been adopted, the question naturally suggested itself: Were not these results after all part of the natural history of snake-bite in the great majority of cases?

Eighteen or twenty years ago, for instance, the medical periodical of Victoria, the *Australian Medical Journal*, gave records of numerous cases of snake-bite treated by the method which, at that time, occupied the mind of the public and the profession, and dominated the practice of the latter to quite the same extent as does Dr. Mueller's method to-day. I refer to Professor Halford's celebrated ammonia treatment. The position of the authors of these two methods with regard to the treatment respectively adopted by them differs to this extent, that while Dr. Halford did not venture to claim that ammonia was an antidote, Dr. Mueller does so very emphatically on behalf of strychnine. But the position of the profession and the public at that time as to ammonia, and to-day as to strychnine, varies but

little. The enthusiasm for, and the belief in, the "God-like power of ammonia" (Dr. Lano) was just as intense and general in those days as is now the corresponding feeling in favour of the "latest triumph" (Dr. Mueller) of strychnine. Few of us to-day would feel justified in injecting into the jugular or median vein 10 or 20 drops of strongest ammonia, and subjecting ourselves, as did the men of that time, to the taunt of our fellows, should our patient die, that we had not given him enough. The ammonia treatment, the "magical" cures it effected, and the sloughs it caused are things of the past; but the records of the cases in which it was used remain, and they are curious and interesting when read along with the records of the cases treated during recent years by Dr. Mueller's method.

[*Dr. Huxtable then proceeded to give illustrative extracts from the journals of that period, and referred to table No. 4.*]

A glance at those tables and extracts will shew the close similarity between the evidence adduced, the opinions expressed, and the results obtained years ago by ammonia, and now again by strychnine. To complete the similarity of evidence adduced in the two cases, Dr. Halford also records a case of spider-bite treated by ammonia, just as Dr. Mueller records a similar case treated by strychnia, the results in each case being stated as singularly striking and effective, and being attributed in the first case to the ammonia, and in the second to the strychnia employed. A perusal of such statements forces one to the conclusion that it is essential to treat the clinical evidence with respect to strychnine in snake-bite as suggested above—that is to say, by studying the average results of a large number of cases, and comparing these results with those obtained by other methods of treatment,—before any reliable deductions can be made from it. In attempting to follow out this idea it soon became obvious that the corner-stone of the whole inquiry as to the efficacy of cures, antidotes, or remedies of any kind must be the establishment of what might be called the normal death-rate among the snake-bitten persons in Australia. Insuperable difficulties, however, lie in the way of such an inquiry, from the fact that, in almost every case of snake-bite, treatment of some, and often of a very active, kind is undertaken. The nearest approximation to what is desired appears to be the establishment of a death-rate among snake-bitten persons in whatever manner treated, and the comparison of the result thus obtained with the death-rate among those subjected to the special treatment by the strychnia method. In the tables giving these results which I now submit, I have made use, as will be seen, of information drawn from widely different sources, for a great deal of which I am indebted to my medical confrères throughout Victoria and Queensland, whose kind and courteous assistance I desire to acknowledge; but before commenting upon these and other tables now submitted, and upon the results that have been thus arrived at, it is necessary to return to the consideration of Dr. Mueller's writings and statements.

[*The author then proceeded to give details, as recorded by Dr. Mueller, of the two cases of snake-bite and one of spider-bite on which Dr. Mueller based his theory and treatment, in concluding his record of which Dr. Mueller says:—"These are the first and the last ones of the cases of snakebite I have treated with strychnine, and they are the best. In others that have come under my observations since I adopted this treatment the symptoms were not pronounced and typical enough to make them worthy of record, and I therefore pass them over."*]

These observations appear to be few and meagre when compared with the theory which Dr. Mueller built upon them, and which we shall now pass on to consider. But in this connection it is necessary in justice to Dr. Mueller to add these words of his from his first paper "On the pathology and cure of snake-bite." He says:—"For this observation a practice of thirty years in a large, well-watered, snake-infested, mountainous district, a life so to say amongst snakes, has given me unusual facilities."

[*Fall extracts from Dr. Mueller's writings were here given, stating his theory as to the action of snake-poison on the "motor and vaso-motor nerve centres.*

* * * * The snake-poison, it appears to me, lowers the functional activity of these centres. * * * * The nerve centres I allude to are principally the anterior columns of the spinal cord. These at least are the first to be affected. * * * * Sensation is at this early stage perfect. This, together with the fact of the paresis being on both sides alike, and rapidly extending upwards, unmistakably points to its central origin in the cells of the anterior columns of the spinal cord."]

The theory, then, which Dr. Mueller's observations have led him to adopt as to the action of snake-venom on the motor and vaso-motor centres is, that the poison lowers the functional activity of these centres, and the nerve centres to which he alludes "are principally the anterior column of the spinal cord. These at least are the first to be affected." Now, in the statement of this theory, the intention of which is otherwise quite clear, some confusion of terminology evidently exists, for we know that there are no motor centres in the anterior columns of the spinal cord. Dr. Mueller has, very possibly from the fact that English is not his mother tongue, fallen into an error, and we may in the meantime fairly assume that he is alluding to the motor cells of the anterior cornua.

[*Extracts from Dr. Mueller's writings were here given, setting forth Dr. Mueller's claim to originality in the matter of the observations of the action of snake-poison on the nerve centres:—"When I published my theory of the action of snake-poison, this action was as great a mystery to medical science as ever it had been." &c., &c. "It appears strange and almost unaccountable that a theory as simple and obvious as that my observations have led me to adopt should never have occurred to any of the investigators who made snake-poison a study," &c., &c., &c. Following these, Dr. Huxtable proceeded to show, by full extracts from the writings of Sir Joseph Fayrer, Drs. Lauder Brunton and Wall, that the study of the action of snake-venom on the nerve centres had been carried to the same point by careful and scientific experiment and observation many years ago.]*

Were it necessary, and did time permit, many extracts equally definite and conclusive might be given from the writings of these three observers to show how fully and scientifically this subject had been investigated and determined many years before Dr. Mueller published his theory. We are therefore forced, however reluctantly, to acknowledge that Australia may not claim originality as regards the elucidation of the action of snake-venom on the nerve centres.

Before passing on to the consideration of the statistical results which I am about to submit, a few words and criticisms are necessary as to the method of treatment which Dr. Mueller urges, and as to some statements he makes in connection therewith. Dr. Mueller, in his paper of April, 1889, says in regard to strychnine:—"This drug is quite inoperative in

alcoholic coma." Now, apart from our common knowledge of the value of strychnine in alcoholic poisoning, I should like to draw attention to a paper published last year by Dr. Gibson, of Edinburgh, in which he demonstrates the value of strychnine not only in alcoholic but in all forms of narcotic poisoning. [*This and other extracts on the point were here given.*] Another statement of Dr. Muellor's which demands criticism is one which he has made as to the degree of mortality from snake-bite. In the *Australasian Medical Gazette* of March, 1889, p. 165, he says:—"My own experience has forced on me the conclusion that the natural course of snake-bite is invariably death, &c." Now, in addition to the evidence of the statistics presented herewith, which show the average death-rate among snake-bitten persons treated by ordinary methods to be only 4.1 per cent., I should like to record along with this opinion of Dr. Mueller's the following extract from Dr. Weir Mitchell's "Essay on Snake-poison," where (at p. 71) he says—"The next case, and the last of this kind, I have placed alone, because it has especial value as showing how exceedingly grave may be the signs of poisoning, and yet how rapid and complete may be the rally and escape." Dr. Weir Mitchell, whose title to speak with authority on this subject none will gainsay, is here stating that which very soon becomes obvious to those who study records of cases of snake-bite, viz., that in cases in which the most extreme symptoms have been present recovery may, and does, occur, independently of any treatment whatsoever.

The treatment used by Dr. Mueller, viz., the hypodermic injection of strychnine in heroic doses, until the physiological action of the drug is manifest, is one which arrests our attention, by reason of the powerful action of the remedy, and the extent to which we are recommended to push it. Dr. Mueller contends that there is possibility of danger only in timidity in its use—in not using it in sufficient quantity. He asserts that his own experience, as well as that of medical men in all parts of Australia, has proven most conclusively that these large doses may be administered with perfect impunity to the sufferers, and produce the most immediately favourable results (*Australasian Medical Gazette*, December, 1891, p. 87):—"The antagonism between the two poisons is a perfect one. Strychnine does not manifest its usual physiological action in the presence of snake-poison until it has completely overpowered the latter, and I have therefore pointed out as a safe guide in practice to watch for the first symptoms of this action being the muscular twitchings, and only then to discontinue the use of this antidote, unless after a time the snake-poison re-asserts itself." Dr. Mueller's recorded experience is limited to two cases, and if we may judge of the safety of this method of procedure by the aggregate results of the cases recorded in the *Australasian Medical Gazette*, to which he refers as an "unbroken record of successes" (*Australasian Medical Gazette*, December, 1891, p. 88), we shall perhaps doubt whether he is justified in making it the basis of so extreme a recommendation, the death-rate among these cases being so high as at once to arrest attention; for it must be borne in mind that in cases of snake-poisoning, as in other narcotic poisoning, the quantity of strychnine which may be injected before this re-action be obtained (if, indeed, in severe cases it be obtainable at all) may be extremely, and possibly dangerously, large.

In referring to a case treated by Dr. Ogle Moore, of Dandenong, Dr. Mueller writes (*Australasian Medical Gazette*, December, 1891, p. 88) criticising Dr. Moore's exhibition of one-fifth grain of strychnine as very insufficient, and says:—"If, as he (Dr. Moore) here asserts, the strychnine

produced muscular spasms in the patient, it would also have restored consciousness, for as soon as the motor impulse to the muscle is re-established the idco-motor centres also resume their action." Now, it is evident that Dr. Mueller is here expressing a very strong opinion without putting us in possession of any facts to warrant his conclusion. Not alone our common knowledge of the powerful nature of the drug, but a perusal of some of the cases tabulated (Table No. 2) will at least arouse suspicion that the exhibition of strychnine in such doses, and according to such rules as have been formulated by Dr. Mueller, may have very disastrous results.

It is obvious that the most important practical question to be determined in relation to the administering of strychnine in these cases is the following, viz.:—May the administration of strychnine be continued in heroic doses with the certainty that fair warning will be given by the disappearance of coma, and by the appearance of the symptoms commonly caused by the drug when the limit of safety in its administration has been reached? or, on the other hand, is there danger of the administration of fatally poisonous doses of strychnine without the appearance of such warning? It is equally clear that this important question is far from being determined, and that such assertions as those of Dr. Mueller, quoted above, are far from being justified by any sufficient evidence. Indeed, while little or no evidence bearing directly upon this point has been recorded, there is evidence furnished by the aggregate results of the cases treated by Dr. Mueller's method that, for some reason or other, that method has, thus far, increased the death-rate among those so treated. Now, we should not imagine that this increased death-rate among snake-bitten persons could possibly be due to too little of the remedy being administered. For example, if out of 100 snake-bitten persons who get no strychnine at all four die, and if out of 100 snake-bitten persons who are treated by strychnine fourteen die, we should not think it possible that this increased death-rate could be due to the latter getting too little of this drug, and the conclusion therefore suggests itself that the increase is possibly due to the latter cases being overdosed with the remedy.

Let me now ask you to turn to the statistics which I submit herewith. Table No. 1 contains a list of cases of snake-bite reported to the Board of Health of New South Wales by the local practitioners resident in this Colony and of cases kindly furnished to me from Victoria and Queensland. Both these series have been collected within the last few months in response to circulars sent by the Board of Health and myself.* Table No. 2 contains a tabular list of all cases referred to in the *Australasian Medical Gazette* since Dr. Mueller's treatment was announced by him, Table No. 3 contains the percentage of mortality among the cases enumerated in the foregoing tables. From this latter it will be seen that the mortality amongst cases treated by strychnine in the series dealt with in Table No. 1 is 5 deaths in 56 cases, or 9·10 per cent., as against 12 deaths in 303, or 3·8 per cent., among those treated otherwise. Also that the mortality among the cases reported in the *Australasian Medical Gazette* since Dr. Mueller's treatment was announced was 10 deaths in 57 cases, or 17·5 per cent., among those treated by strychnine, as against 1 death in 10 cases, or 10 per cent., amongst those treated otherwise; finally, that the aggregate result of these series gives a total of 426 cases, of which 113 were treated by strychnine with 15 deaths, representing a mortality of 13·2 per cent., and

* These circulars simply asked each practitioner to state number of cases treated by him, mode of treatment, and results.

313 cases treated by other methods with 13 deaths, representing a mortality of 4.1 per cent. That the latter rate of mortality, viz.:—4.1 per cent. approximates to facts, is further suggested by observations made many years ago by Dr. McCrea, Chief Medical Officer of Victoria, who found the death-rate among cases treated by ordinary methods to be 5.8 per cent. In each of these series, then, collected from different colonies and communicated through different channels, the result is similar in showing an excess of mortality among those treated by strychnine over those treated by other methods. It should be added that the whole of the information available from these various sources has been impartially utilised in preparing the tables.

So recently as December last, Dr. Mueller has said:—"An unbroken record of successes may be found in the pages of the *Australasian Medical Gazette*." Yet it is seen on computing the death-rate among these "successes" that it strikingly exceeds the death-rate among cases treated in other ways, viz., by 13.2 per cent., against 4.1 per cent.

In this connection another statement of Dr. Mueller's demands criticism. In the *Australasian Medical Gazette* of December, 1891, he says:—"Scores of valuable lives would have been lost within the last three years if its dictum had been adopted." (The "dictum" to which Dr. Mueller refers is that of the Medical Society of Victoria, which he infers was adverse to his method of treatment.) Now, a glance at Table No. 5 will show that the average annual mortality among snake-bitten persons in the three colonies of Queensland, Victoria, and New South Wales has been, for the decennial period 1882 to 1891, 10.6, a mortality which has been exceeded in each of the three years to which Dr. Mueller refers, being in 1889, 16; in 1890, 11; and in 1891, 11. The returns for South Australia and West Australia show so trifling a mortality (8 deaths in 10 years in the two colonies taken together) that for the sake of clearness they have not been introduced here. This Table, therefore, appears hardly to justify Dr. Mueller's statement, for had the latter been in accordance with these facts it is clear that the mortality from snakebite during these years must have been reduced to nil.

Such, then, have been the results of the treatment of snakebite by strychnine in all the cases of which it has been possible to obtain records to the present time, and these results show that the death-rate among these cases is considerably in excess of that among a large number of cases treated by other methods.

I am aware that the statistical method of dealing with such a subject as this is liable to various fallacies, often fatal to any reliable deduction being made from it, and it is clear that to infer from these figures that strychnine is valueless in snakebite would be unwarrantable. The clinical evidence afforded by a perusal of the cases recorded, moreover, forbids such an inference, for there can be little doubt that cases, uncomplicated by alcohol or any other disturbing element, have been relieved of urgent symptoms by the injection of the drug just as they undoubtedly were by the injection of ammonia, a method the risk and difficulties of which have, very properly, led to its discontinuance. With the strychnine method there is no such difficulty. Its administration may be trusted to the hands of the most unskilled person, and there is but one risk, that, viz., of over-dose. Are we to conclude, then, that the increased death-rate among those who have been treated by this method to the present time is due to disregard of this risk? As to this question, the tables of cases and mortality appear to be very suggestive, but

whether that question is to be answered in the affirmative or negative, it seems at least quite clear that the facts do not warrant the administration of this drug in the excessive doses which have been frequently urged.

In compiling the material on which this paper is based, I have studied the records of some hundreds of cases of snakebite, and come to some conclusions, which, since space forbids that I should support them by evidence, must be taken for what they are worth:—1st. I have been led to the conclusion that in the great majority of cases strong and healthy adults recover from the bite of even our most venomous Australian species without the aid of treatment of any kind. This must not be interpreted into an expression of opinion that none of our snakes are capable of killing such an adult, but simply that in the circumstances in which snakebite is suffered in these Colonies, differing largely from those of India, where the natives are very inefficiently protected by clothing, the vast majority of the former recover, even where the treatment adopted has militated, as it so often does, against their chances. 2nd. That, on the other hand, in the cases of children, especially infants under two years of age, the bite of a venomous snake is very deadly, and rarely recovered from, many such cases proving fatal within fifteen or twenty minutes. 3rd. That the methods of treatment commonly in vogue are pernicious, and are sometimes the immediate cause of death. This observation applies especially to over-dosing with alcohol, and to forced exercise pushed to exhaustion. The records of the amount of alcohol administered are astounding; and are in many cases the obvious cause of fatal poisoning. The fourth I shall state in the words of Sir Joseph Fayrer, who has so long worked in this field, to whose kindness I am indebted for a great deal of important literature on the subject, and who, in a letter to me in June last, says:—"As to the antidotes, you already know what I think of them. Of snake-poison, as of all other poisons, there is a quantity, however small, which does not kill. From such a quantity, by the aid of care, nursing, and stimulants, a poisoned person may recover; but as to any physiological antidote which shall follow the poison into the circulation and neutralise it there, and restore the nerve-centres to their normal condition, I do not believe it exists, though I most cordially support all scientific and well-directed efforts and researches in quest of it. I cannot say, of course, that strychnine will prove futile like others, but as far as snake-poison is concerned—I mean, of course, really fatal doses of the poison of a deadly snake—I fear it will prove unsatisfactory."

Nevertheless, for the treatment of those cases (and in Australia they appear to comprise by far the largest number) in which such a quantity of the poison as does not inevitably kill has been absorbed, Dr. Mueller has, it seems to me, introduced to us a remedy which, judiciously used, may cut short or relieve the most urgent symptoms, and may in some cases turn the scale of life in favour of the patient. So used, there are physiological reasons for believing that strychnine will prove in snake-poisoning, as in other narcotic-poisoning, of great value, but there seems to be no sufficient ground for regarding it as in any sense an antidote, and the facts which are put together in this paper may serve as a warning against its misuse.

Before closing, I may be permitted to express my sincere regret that the author of this widely-known plan of treatment is unable to attend the meeting of Congress. It would have been more satisfactory to me to have offered these comments on his writings in connection with this subject in his presence, but I trust the criticism, though not altogether favourable, will not be

regarded as unfriendly by one who has introduced to us in Australia a remedy of much promise for an accident, which, when it occurs, is often the cause of great, and sometimes fatal, terror on the part of the patient, and of foolish and harmful methods of treatment on the part of his friends.

TABLE NO. 1.

TABULAR list of cases reported to Board of Health, N.S.W., by medical practitioners resident in that colony, and to Dr. Huxtable by those resident in Queensland and Victoria, in reply to circulars of August last, sent to the whole of the registered practitioners in N.S.W., and to all those practising in country districts in the other two colonies.

	Cases treated by Strychnia.			Cases subject to treatment other than Strychnia.			
	No.	Recvd.	Died.	No.	Recvd.	Died.	Grand Total.
New South Wales—							
Dr. Chisholm, Ashfield	...	...	...	5	5	0	5
Dr. Govett, Leichhardt	...	...	...	1	1	0	1
Dr. Connor, Lismore	...	...	...	4	4	0	4
Dr. Morgan, Wagga	...	...	...	4	3	1	4
Dr. Breton, Wentworth	...	...	...	1	1	0	1
Dr. Thomson, Silverton	...	...	...	1	1	0	1
Dr. Ross, Molong	...	...	...	12	12	0	12
Dr. Belgrave, Silverton	...	...	...	1	1	0	1
Dr. Boot, Moruya	...	...	...	7	7	0	7
Dr. Brady, Penrith	...	...	...	1	1	0	1
Dr. Wood, Ashfield (?)	...	...	...	Several		0	
Dr. Woods, Uralla	...	...	...	20	20	0	20
Dr. Newmarch, Sydney	...	...	...	2	2	0	2
Dr. MacLaughlin, Glen Innes	...	...	...	1	1	0	1
Dr. Lyttleton, Adelong	...	...	...	1	1	0	1
Dr. J. J. Hood, Maclean	...	...	...	1	1	0	1
Dr. Grady, Sunny Corner	...	...	...	2	2	0	2
Dr. Evershed, Bega	...	...	...	4	4	0	4
Dr. Taylor, Oberon	...	...	...	2	2	0	2
Dr. Read, Kiama	...	...	...	1	1	0	1
Dr. Merrifield, Bombala	...	...	...	3	3	0	3
Dr. Lambert, Berrima	...	...	...	2	1	1	2
Dr. Foord Hughes, Bungendore	...	...	...	1	1	0	1
Dr. Forbes, Wardell	...	...	...	3	3	0	3
Dr. Crommelin, Casino	...	...	...	6	4	2	6
Dr. Nagel, Bingara	...	...	...	1	1	0	1
Dr. Gregson, Muswellbrook	...	...	...	Several		0	
Dr. Morison, North Sydney	...	...	...	Several		0	
Dr. Meeks, Candelo	1	1	0	0	0	0	1
Dr. Clarke, Newcastle	1	1	0	0	0	0	1
Dr. Lile, Moree	2	2	0	0	0	0	2
Dr. Macdonnell, Forbes	1	1	0	4	4	0	5
Dr. Rogers, Greta	1	1	0	0	0	0	1
Dr. Laue, Inverell	1	1	0	1	1	0	2
Dr. Mathews, Nowra	1	1	0	0	0	0	1
Dr. Reddall, Randwick	...	...	...	1	1	0	1
Carried forward	8	8	0	93	89	4	101

NOTE.—From this Table those cases have been eliminated which are dealt with in Table No. 2, so that the same case is not dealt with twice.

TABLE NO. 1—*continued.*

	Cases treated by Strychnia.			Cases subject to treatment other than Strychnia.			
	No.	Recvd.	Died.	No.	Recvd.	Died.	Grand Total
Brought forward	8	8	0	93	89	4	101
New South Wales— <i>continued.</i>							
Dr. Cameron, Wingham	2	2	0	2	2	0	4
Dr. Lee, Wollongong	1	1	0	0	0	0	1
Dr. Marshall, Bega	1	1	0	0	0	0	1
Dr. Milford, Sydney	1	1	0	2	2	0	3
Dr. MacRoberts (?) Uralla	3	3	0	0	0	0	3
Dr. Colpe, Nymagee	2	1	1	0	0	0	2
Dr. Smith, Cowra	1	1	0	2	2	0	3
Dr. V. A. Smith, Murrumburrah.....	1	1	0	0	0	0	1
Dr. Mallam, Armidale*	2	1	1	1	1	0	3
Dr. Johnstone, Cudal	2	2	0	1	1	0	3
Dr. Putom, Wiekham.....	1	1	0	0	0	0	1
Dr. Parry, Young	2	2	0	0	0	0	2
Dr. Buecknell, Kogarah	1	1	0	0	0	0	1
Dr. Fitzpatrick, Crookwell	1	1	0	3	3	0	4
Dr. Drought, Crookwell†	5	5	0	0	0	0	5
Dr. Clay, Rockdale.....	1	1	0	0	0	0	1
Dr. P. Blackall, Queanbeyan	2	2	0	0	0	0	2
Dr. Peiree, Coast Hospital.....	...	...	...	1	1	0	1
Dr. Williamson, Rydalmere	...	...	...	1	1	0	1
Dr. Violette, Parramatta	...	...	...	3	2	1	3
Dr. Tristram, Warksworth	...	...	...	4	4	0	4
Dr. Thane, Yass	...	...	...	2	2	0	2
Dr. F. Kyngdon, North Sydney	...	...	...	2	1	1	2
Dr. Callum	...	...	...	2	2	0	2
Dr. Mellish, Wallsend	...	...	...	1	1	0	1
Dr. Struthers, Rylstone.....	...	...	...	1	1	0	1
Dr. Turton, Newcastle	...	...	...	1	1	0	1
Dr. Hutching, Young	...	...	...	1	1	0	1
Dr. W. S. Brown, Parramatta	...	...	...	1	1	0	1
Dr. Bell, Murrurundi	...	...	...	3	3	0	3
Dr. Bateman, Albion Park	...	...	...	12	11	1	12
Dr. J. M. Creed, Woollahra	...	...	...	11	10	1	11
Dr. ——— (?)	...	...	...	5	5	0	5
Dr. Paton, Sydney	...	...	...	3	3	0	3
Dr. J. Parker, Redfern	...	...	...	1	1	0	1
Dr. M. Mathison, Waverley.....	...	...	...	7	7	0	7
Dr. Lenhoff, Glebe	...	...	...	1	1	0	1
Dr. Hull, Sydney	...	...	...	1	1	0	1
Dr. J. B. Graham, Balmain	...	...	...	1	1	0	1
Dr. Bassett, Bathurst.....	...	...	...	13	13	0	13
Dr. Bartlett, Cowra	...	...	...	2	2	0	2
Dr. J. Crabbe	...	...	...	4	3	1	4
Dr. Cohen, Darlinghurst	...	...	...	5	5	0	5
Dr. F. Bond, Penrith	...	...	...	1	1	0	1
Dr. Asher, Lithgow.....	...	...	...	1	1	0	1
Dr. Eddie, Bombala	...	...	...	Several		0	
Dr. Andrew, Albury	...	...	...	10	10	0	10
Carried forward	37	35	2	205	196	9	242

* Saw about a dozen other cases which never had any symptoms.

† In addition to one case reported in A.M.G. ; *vide* Table 3.

TABLE NO. 1—continued.

	Cases treated by Strychnia.			Cases subject to treatment other than Strychnia.			
	No.	Recvd.	Died.	No.	Recd.	Died.	Grand Total.
Brought forward	37	35	2	205	196	9	242
Other Colonies—							
Dr. Murray, Cunnamulla	1	1	0	0	0	0	1
Dr. Hunt, Toowoomba ?	1	1	0	1	1	0	2
Dr. Kerr, Orlion, Gippsland	1	1	0	0	0	0	1
Dr. Moore, Cheltenham	1	1	0	0	0	0	1
Dr. Sethbridge, Alexandria	1	0	1	2	1	1	3
Dr. Hodgson, Dandelong	1	1	0	0	0	0	1
Dr. Longden, Buninyong	1	1	0	1	1	0	2
Dr. Donnell, Toowoomba †	...	...	...	1	1	0	1
Dr. Austin, Kerang	1	1	0	0	0	0	1
Dr. ———, ...	1	0	1	1	1	0	2
Dr. H. Rabl, Murtoa	1	1	0	0	0	0	1
Dr. Phillips, Warwick	3	3	0	13	12	1	16
Dr. Garde, Maryborough*	2	2	0	2	2	0	4
Dr. Baird, Helenville	2	2	0	0	0	0	2
Dr. Duncan, Bairnsdale	...	...	...	5	5	0	5
Dr. Dobbin, Castlemaine	...	...	...	1	1	0	1
Dr. Moffit, Creswick	...	...	...	1	1	0	1
Dr. Whitecombe, Ballarat	...	...	...	4	4	0	4
Dr. James Smeal, Ararat	...	...	...	5	5	0	5
Dr. Bird, Bont	...	...	...	1	1	0	1
Dr. Fleetwood, Warnambool	...	...	...	14	14	0	14
Dr. Hudson, Eastwood	...	...	...	1	1	0	1
Dr. Sheaf, Toowoomba	...	...	...	1	1	0	1
Dr. ———, (?)	...	...	...	1	1	0	1
Dr. Gordon, Ballarat	...	...	...	3	3	0	3
Dr. Hooper, Mornington	...	...	...	2	2	0	2
Dr. Clark, Heathcote	...	...	...	1	1	0	1
Dr. King, Melewa, Victoria	...	...	...	1	1	0	1
Dr. Trehearnei, Creswick	...	...	...	4	4	0	4
Dr. Stuart, Roekhampton	...	...	...	5	5	0	5
Dr. Rankin, Dookie	...	...	...	6	6	0	6
Dr. Gunning, Narracoorte	...	...	...	4	4	0	4
Dr. Lloyd, Mackay	...	...	...	4	4	0	4
Dr. Hewer, Longreach	...	...	...	1	1	0	1
Dr. Mueller, Yaeandandah	2	1	1	12	11	1	14
Totals.....	56	51	5	303	291	12	359

† In addition to 3 reported in A.M.G. *Vide* Table No. 3.

‡ In addition to 2 " "

* In addition to 1 " "

NOTES TO TABLE NO. 1.

R. Eddie, Bonibala. All cases recovered after ammonia treatment. Number not stated.

Dr. Heeley, Young, states that at Victoria, on the Goulburn River, he saw 50 or 60 cases. Has never seen an adult die, though he has seen several children do so. Has never used the strychnia treatment.

Dr. Arthur Andrew, Albury, has seen about 10 cases; none were ever in danger. Three of these had the stomach-pump used to evacuate alcohol.

Dr. Byrn, of Castleton, Victoria, states that he has treated about 10 cases with no deaths. Strychnia not used.

(The above are examples of instances of which there were many, in which the information received was indefinite. Such returns are not included in the tables.)

TABLE No. 2.

Cases reported in A.M.G. since Dr. Mueller's Treatment was announced.
(The cases treated with Strychnia are prefixed by S.)

	Reported by.	Where reported.	Age.	Symptoms.	Treatment.	Result.
1	Editor	A.M.G. p. 173 April, 1890	adult	Kept awake for 36 hours and then "was getting sleepy."	Bitten limb immersed in running water.	Recovery
S 2	Dr. Queeley, Q.	A.M.G. p. 156 April, 1890.	19	Collapse, cold extremities, great inclination to sleep.	Handkerchief ligature; scarification; Liq. Strych. m. 65 in all.	do
S 3	Dr. Garde, Q.	A.M.G. p. 157 April, 1890.	13	Nervous, exhausted, some dragging of legs.	Ligature; incisions, Liq. Strych. m. xxv. in 10 mins.	Recovery in 4 hours
S 4	do ..	A.M.G. p. 157 April, 1890.	22	No symptoms	Similar treatment	Recovery in 2 hours
S 5	do ..	A.M.G. p. 157 April, 1890.	16	"Slight indeed; might be partly ascribed to fright."	Ligature and incisions; Liq. Strych. m. xii.	Recovery
S 6	Dr. Pain, Q.	A.M.G. p. 125 February.	young man.	"Collapsed" & cyanosed	Prompt excision, and, later, ligature; Liq. Strych. m. xlv., in all from 7.15 o'clock to 10; freely dosed with Brandy and ammonia.	Recovery in 6 hours
7	Dr. M'Kenzie, Wodonga.	A.M.G. p. 203 May, 1890.	50	Unconscious, legs powerless, unable to swallow.	Ligature; Pot. Permanganat, and Ether hypodermically.	Recovery
8	do ..	A.M.G. p. 203 May, 1880.	not given.	Particulars not given ..	Pot. Permanganat	do
9	do ..	A.M.G. p. 203 May, 1890.	do	do ..	Pot. Permanganat	do
S 10	Dr. Perry, Emmaville, N.S.W.	A.M.G. p. 167 Mar., 1891.	30	Coma; unable to swallow	Ligatures; Liq. Strych. m. 25 in 1 hour, causing slight twitchings; followed by Easton's Syrup.	do
S 11	Dr. Maedonald, Tweed River, N.S.W.	A.M.G. p. 168 Mar., 1891.	adult	Legs powerless, eyes closed, pupils contracted, face congested, great drowsiness, pulse fast and weak.	Ligature; scarification; local Ammonia; Alcohol oz. iv. and Ammonia—Hypodermic of Ammonia; lastly Liq. Strych. m. 45 in 1½ hours.	do
12	do	A.M.G. p. 168 Mar., 1891.	young lad.	Coma lasting 24 hours.	Scarification; Ammonia in Brandy.	Recovery in 36 hours
S 13	Dr. Clutworthy, Townsville.	A.M.G. p. 168 Mar., 1891.	4	Heavy breathing, skin dusky, sleepy, followed (after brandy Liq. Strych. m. v.) by coma, with slow R. and P., and blue skin; R. ceased before heart.	Incision; Ammonia locally; Brandy enema; Liq. Strych. dr. i. in all, over pectoral muscles; artificial resp.	Death in 2½ hours
S 14	Dr. Campbell, Grafton.	A.M.G. p. 160 Mar., 1891.	20	Drowsy, inclined to vomit, pupils somewhat dilated, restive, pulse fast.	Ligature; scarification; Brandy oz. i. (?); Liq. Strych. m. 25 in 40 mins.	Recovery
15	Dr Thon.	A.M.G. p. 123 Jan., 1891.	14	Vomiting (after alcohol and ammonia), coma, pulseless, heart slow, intermittent, faint.	Alcohol and Ammonia internally; intravenous inject. 12½ drops strong Ammonia with water. Repeated.	Recovery in 3½ hours

TABLE NO. 2—continued.

	Reported by	Where Reported.	Age.	Symptoms.	Treatment.	Result.
S 16	Dr. Ray, Seymour, Vic.	A.M.G. p. 137 Feb., 1891.	adult	Semi-coma, unable to walk, pupils dilated, pulse 80, rising to 120, after strychnine.	Incision; Brandy oz. iv. (?) ; Strychnine (hypodermic) gr. i. in 14 hours.	Recovery
S 17	Dr Forbes, Charters Towers.	A.M.G. p. 141 Feb., 1891.	6	Drowsy, vomiting, dilated pupils, pulse fast and soft; later cramped and collapsed.	Ligature; scarification; Alcohol; Liq. Strychnine m.x.	Recovery in a few hours
S 18	do	A.M.G. p. 141 Feb., 1891.	20	Stiff, could not walk, pulse slow, resp. hurried, pupils dilated, very drowsy. "Symptoms might be due to combined effect of fear and alcohol."	Scarification; Alcohol; Liq. Strychnine m.v.	Recovery
S 19	Dr. Holmes, Launceston.	A.M.G. p. 225 May, 1891.	adult	Pulse fairly strong, pupils contracted, pain on swallowing, almost unconscious, vomiting after second injection, "singing," liveliness continued until she became conscious.	Alcohol (?) ; incision; leeches; Liq. Strychnine m. 180 in 4½ hours. "Brandy and water during whole time when she could be got to swallow."	do
S 20	Dr. Yeatman, Auburn, S.A.	A.M.G. p. 91 Dec., 1890.	45	Coma	Alcohol. "The alcohol got rid of by prompt emetics." Liq. Strychnine m.xv., followed 3 hours after by strong convulsions.	Recovery. Nervous System affected for months
S 21	Dr. McDonnell, Toowoomba, Q.	A.M.G. p. 151 Feb., 1891.	10	Slight drowsiness, copious vomiting.	Ligature; suction; Liq. Strychnine m.ii.; whisky, ¼ of an ordinary bottleful.	Recovery
S 22	Police, Murrurundi.	A.M.G. p. 211 April, 1889.	not given	Not given	Liq. Ammonia and Acid Carbolic locally; Liq. Strychnine (quantity not given) hypodermically.	do
S 23	Police, Armidale.	A.M.G. p. 211 April, 1889.	do	do	Liq. Strychnine (quantity not given) hypodermically.	do
S 24	do	A.M.G. p. 211 April, 1889.	do	do	do do	do
S 25	do	A.M.G. p. 211 April, 1889.	do	do	do do	do
S 26	do	A.M.G. p. 211 April, 1889.	do	do	do do	do
S 27	do	A.M.G. p. 211 April, 1889.	do	do	do do	Death
S 28	Police, Glen Innes.	A.M.G. p. 211 April, 1889.	60	do	Ether; alcohol; ammonia internally; Potassium Permanganate, locally.	Recovery
S 29	Police, Inverell.	A.M.G. p. 211 April, 1889.	not stated	do	Liq. Strychnine (quantity not stated) hypodermically	do
S 30	do	A.M.G. p. 211 April, 1889.	do	do	do do	do
S 31	Dr. Drought, Crookwell, N.S.W.	A.M.G. p. 211 April, 1889.	adult	Very drowsy	Incisions; ligature; Liq. Strychnine m.xx. hypodermic.	do in 12 hours
S 32	Dr. Kingsbury, Newtown.	A.M.G. p. 245 May, 1891.	do	Comatose, almost pulseless.	Strychnine 4/50 gr. in ¾ hour (twitchings).	Recovery

TABLE No. 2—continued.

	Reported by	Where Reported.	Age.	Symptoms.	Treatment.	Result.
S 33	Dr. Weekes, Lithgow.	A.M.G. p. 149 Feb., 1891.	adult	Comatose, "all usual symptoms of snake-bite poisoning, convulsions.	Liq. Strych. m. xxx. in 20 minutes.	Recovery
S 34	do ..	A.M.G. p. 149 Feb., 1891.	not given	do	Liq. Strych. m. xv.	do
S 35	do ..	A.M.G. p. 149 Feb., 1891.	do	do	do do ..	do
S 36	Dr. Ray, Seymour Vic.	A.M.G. p. 149 Feb., 1891.	16	Tendency to coma	Liq. Strych. m. 180 in 6 hours; "well marked toxic symptoms were (now) developed and compelled to stop, as muscles of neck and face were strongly affected, and muscles of respiration were so much influenced as to render breathing rather difficult." Toxic symptoms subsided in about $\frac{1}{2}$ an hour after last injection, and he looked to be recovering. "2 hours after comatose — 40 ms. injected." No effect produced, and death was evidently due to paralysis of respiratory organs.	Death
S 37	Dr. Wigan, Armidale.	A.M.G. p. 171 Mar., 1891.	not stated	Comatose	Rum ! Ligature ; excision ; Strych. 2/26 gr. hypoderm.	Recovery in 36 hours
S 38	do ..	A.M.G. p. 179 Mar., 1891.	adult	Very sleepy	Strych. gr. 1/25	Recovery 36 hours
S 39	Police, Forbes.	A.M.G. p. 243 May, 1891	do	Comatose	Strych. (quantity not stated).	Recovery
S 40	Police, Rydal.	A.M.G. p. 243 May, 1891	5 years.	Not stated	do do	do
41	Police, Molong	A.M.G. p. 243 May, 1891.	16 months	do	Ligature ; scarification..	Death in 24 minutes
S 42	Dr. McDonnell, Toowoomba	A.M.G. p. 120 Feb., 1892.	8 years.	Hæmatemesis, pupils widely dilated, resp. slow, and mind clear, drowsy, later (after treatment) collapsed, cyanosed.	Liq. Strych m. 28 (slight tetanic spasms in arms)	Death in 1½ hours after treatment began.
S 43	Dr. Purser	A.M.G. p. 121 Feb., 1892.	13 years.	Drowsy, vomiting, pulse 120, small wiry.	Liq. Strych. m. xvi. in all (32 hours).	Death in 37 hours from bite.
S 44	Dr. Hunt, Toowoomba	A.M.G. p. 78 Dec., 1892.	16 months	Almost comatose, pupils fully dilated and insensible to light, pulse rapid, feeble, irregular	Prompt amputation of finger ; brandy and ammonia : Liq. Strych. m. 8 (slight twitchings) ; Faradisation of spine.	Recovery complete next day.
45	Editor, A.M.G.	A.M.G. p. 86 Dec., 1891.	adult	"General drowsiness" ..	Immediate scarification and suction.	Recovery
S 46	Dr. O. Moore, Dandenong	A.M.G. p. 16 Dec., 1891.	"	Stupor, collapse, pulse barely perceptible.	Ammonia and Ether hypodermically ; galvanism ; Strych. gr. 1/5 (in 3 hours) ; muscular twitchings.	do

TABLE No. 2—*continued.*

	Reported by	Where Reported.	Age.	Symptoms.	Treatment.	Result.
S 47	Dr. Bennett, Gulzong, N.S.W.	A.M.G. p. 10 Jan., 1892.	adult	Semi unconscious, unable to articulate, no discernible pulse.	Ammonia hypodermically; incision and suction; Brandy oz. i.; Liq. Strych. 30 ms.	Recovery
S 48	Police Grenfell	A.M.G. p. 90 Dec.	7	"Lost his sight," vomited freely.	Ligature; scarification; Ammonia locally; Whisky 1 gill; Ether and Strych. hypodermically 1/20 gr. (occasional twitchings)	do
S 49	Dr. Stoker, Kerang, V.	A.M.G. p. 90 Dec.	19	Very drowsy, staggering gait.	Immediate ligature (fingers); venesection 7-8 oz.; stimulants: Strych. 1/5 gr.	do
S 50	Dr. Pain, Allora, Q.	A.M.G. p. 115 Jan., 1892.	9	Comatose fit, pupils contracted, pulse 100 (almost imperceptible vomiting.)	Scarification and suction and ligature immediate; magneto-electricity Strych. 3/20 gr.; Brandy until remarkably drunk.	do
S 51	do	A.M.G. p. 139 Feb., 1892.	13	Pulseless, cold livid, apparently dead.	A bottle and a half of Rum; violent and prolonged exercise; later Strych. 1/4 gr. in all.	Death in 18 hours
S 52	Dr. Mead, Quirindi.	A.M.G. p. 137 Feb., 1892.	15	Extremely sleepy, fainted after some hours of constant forced exercise.	Tumblerful of Whisky; Strych. 1/2 gr. in 12 hours.	Recovery
S 53	Dr. Wrigly, Glen Innes.	A.M.G. p. 187 Feb., 1892.	10	Comatose cyanosed, pupils fully dilated, heart action feeble.	Galvanism over heart; Liq. Strych. m. 15?; muscular twitchings immediately before death; Brandy and Beef-tea, small quantities.	Death.
S 54	Dr. Hayes, Warragul, Vic.	A.M.G. p. 139 Feb., 1892.	3	Vomiting, slight drowsiness, going on (while under treatment) to coma.	Ligature; excision; Pot. Perman. locally; Sp-Ammon. Arouat. every 1/2 hour; Liq. Strych. m. viii. until spasmodic movements of limbs and head took place, and continued until death took place.	do
S 55	do	A.M.G. p. 139 Feb., 1892.	adult.	Not stated	"Almost nil." (not stated further.) Presumably Strych.	Recovery
56	Police, Bingera.	A.M.G. p. 168 Mar., 1892.	do	Drowsy	Prompt ligature; Brandy; forced exercise.	do
S 57	Police, Paterson	A.M.G. p. 168 Mar., 1892.	do	Not stated	Piece of finger promptly bitten out and ligature; Strych. injected (quant. not stated).	do
S 58	Police, Greta ..	A.M.G. p. 169 Mar., 1892.	do	do	Immediate scarification and ligature; Liq. Strych. m. x.	do complete in 5 hours.
S 59	Dr. Gamble, Walhalla, Vic.	A.M.G. p. 169 Mar., 1892.	do	Vomiting, stupid benumbed, drowsy pupils very much contracted, complexion livid, slow and feeble pulse.	Brandy given freely at short intervals; Liq. Strych. m. xxx. and m. xv. by mouth; forced exercise for 8 hours; some slight tetanic spasms.	Recovery

TABLE NO. 2—*continued.*

	Reported by	Where Reported.	Age.	Symptoms.	Treatment.	Result.
S 60	Dr. Helsham, Richmond, N.S.W.	A.M.G. p. 169 Mar., 1892.	25	Unconscious, shallow resp. feeble pulse, dilated pupils.	Brandy moderately; Liq. Strych. m. xxvi. in 25 minutes; retraction of head, risus sardonicus, and pretty sharp tetanic convulsions on and off for 2 hours; enema Pot. Brom. gr. 40.	Recovery
S 6	do	A.M.G. p. 170 Mar., 1892.	adult	Unable to walk or see her way, respiration shallow, deadly feeling over.	Liq. Strych. m. xvii. in half-hour; slight musc. twitchings in arms.	Recovery in $\frac{1}{2}$ an hour.
S 62	Dr. Johnson, Avoca, Vic.	A.M.G. p. 170 Mar., 1892.	do	Comatose, pupils dilated, eyes turned up, pulse slow and feeble, resp. shallow.	Ligature amput. of finger; Brandy, Liq. Strych. m. 47. in half-hour; a few musc. spasms.	Recovery
S 63	Dr. Treloar....	A.M.G. p. 198 April, 1892	do	Drowsy, pale, nervous, vomiting.	Prompt ligature depression; Liq. Strych. m. xx.	Recovery complete in 5 hours.
S 64	Dr. Bennett, Gulgong.	A.M.G. p. 208 May, 1892.	do	Vomiting, perfectly insensible, pulse imperceptible.	"A quantity of rum poured down her throat"; Liq. Strych. 52 ms. in half-hour.	Recovery (hysteria) for 1 week
S 65	Dr. Johnstone, Myrtleford.	A.M.G. p. 233 May, 1892.	70	Collapse, could not swallow, no power in limbs	Ligature, forced exercise; Strych. grs. 2/15 in half-hour, very slight twitching of muscles,	Death.
S 96	Dr. Barrington, Benalla.	A.M.G. p. 233 May, 1892.	girl	Very drowsy, could answer questions when roused, pupils moderately dilated, though not visible; heart sounds feeble.	"As usual, alcohol freely administered." Liq. Strych. m. 57 in 3 hours. Difficulty in mastication and spasmodic contractions in leg muscles.	Recovery 13½ hours
S 67	Dr. Hester, Stockton.	A.M.G. p. 265 June, 1892.	16	Quite sensible but sleepy, widely dilated pupils, pulse 120, could speak and walk; on attempting to drink, tetanic spasms (before strych.)	Alcohol, about 1 oz.; Strych. 4/10 gr. in 1 hour.	Death.

TABLE NO. 3.

GIVING Totals and Averages of foregoing Tables.

	Table No. 1.			Table No. 2.			Grand Totals.		
	No. Treated.	Deaths.	Mortality %	No. Treated.	Deaths.	Mortality %	No. Treated.	Deaths.	Mortality %
Cases treated by Strychnia	56	5	9·10	57	10	17·5	113	15	13·2
Cases treated otherwise...	303	12	3·8	10	1	10.	313	13	1·4

NOTE TO TABLE 3.—Dr. Wm. McCrea, Chief Medical Officer of Victoria, states (in A. M. J. of July, of 1875) that in 190 cases treated by ordinary methods and reported to him, there were 11 deaths, or a percentage mortality of 5·8, which corresponds closely with the results of these tables given above.

TABLE No. 4.

EXAMPLES of Professor Halford's cases, published in A. M. J., March, 1875.

No.	State of Patient at the time of Injection.	Effects of the injection.	Quantity Liq. Ammon. Fort. injected.	Result.
No. 1 A man.	Insensible; pupil fixed and dilated; pulse nearly gone.	Roused up immediately.	12 m. Liq. Am. Ft. c. 20 m. aquæ.	Recovery
2. A man.	Insensible; pupil dilated; heart's action depressed.	Roused up immediately.	10 m. Liq. Am. Ft. c. 20 m. aquæ.	do
3. A woman.	Only stated as being a bad case. Dr. Irwin's death prevented getting further particulars.	Beneficial	A quantity injected into a vein above the wrist.	do
4. A man.	Comatose; sinking rapidly ...	"Would have died but for the injected ammonia."—T. O'G.	25 m. Liq. Ammon.	do
5. A girl, æet. 14.	Total paralysis; stupor; pupils fixed and dilated.	Roused in a few minutes.	15 m. Liq. Ammon.	do
6. Boy, æet. 18.	Comatose; pupils fixed, dilated.	Roused immediately.	10 m. Liq. Am. Ft. c. 20 m. aquæ.	do
7. A boy, æet. 9.	Icy cold: comatose; evidently sinking.	Roused immediately.	25 m. Liq. Ammon.	do
8. A man.	Comatose; pupils fixed, dilated; pulseless, evidently dying.	Roused in one minute.	10 m. Liq. Am. Ft. c. 20 m. aquæ.	do
9. A boy, æet. 17.	Symptoms of drunkenness, none of snake-poisoning.	Got sober almost immediately.	1 dr. Liq. Ammon.	do
10. A man.	Insensible; pupils fixed, dilated; several relapses.	Roused upon each application of the remedy; symptoms returned on loosening the ligature.	Five times with 30 m. Liq. Am., and once with 20 m. Liq. Am. Ft.	do
11. A woman.	Comatose; pulseless; pupils dilated and fixed; surface of body cold and clammy.	Immediate effect on the pulse: conscious in twenty minutes.	30 m. Liq. Ammon.	do
12. A woman.	Symptoms slight, threatening insensibility.	Roused at once ...	30 m. Liq. Ammon.	do
13. A woman.	Insensible; pupils dilated and fixed; condition alarming.	Roused at once and walked about.	12 m. Liq. Am. Ft. c. 20 m. aquæ.	do
14. A boy, æet. 14.	Pulseless and insensible; symptoms of snake-poisoning coming on after removal of the ligature; pupils fixed, eyes glassy.	Roused at once, with spasmodic movements of arms.	6 m. Liq. Am. Ft. c. 2 dr. aquæ.	do

TABLE No. 4.

RETURN showing the Mortality in the Colonies of Queensland, New South Wales, and Victoria, from Snake-bite, 1882 to 1891 inclusive, from Returns furnished by the Statistical Departments of the respective Colonies.

	Queensland.	N. S. Wales	Victoria.	Total.
1882	3	None	4	7
1883	None	4	2	6
1884	5	8	3	16
1885	None	3	3	6
1886	None	5	4	9
1887	6	3	7	16
1888	None	5	3	8
1889	10	4	2	16
1890	None	9	2	11
1891	1	5	5	11
Totals	25	46	35	106
Showing an average annual mortality of.....	2·5	4·6	3·5	10·6

Snake-Poison; its Physical and Chemical Qualities and Physiological Action.

A. MUELLER, M.D., CH.-D. (GIESSEN).

As a paper on the action of snake-poison and the use of stryehnine as an antidote, which was read before the Second Interecolonial Medical Congress, has been omitted from the published transactions of that Congress, the writer has been requested by a member of the Executive Committee of the Third Australasian Medical Congress, to be held at Sydney in September next, to bring the subject before the latter Congress.

PHYSICAL AND CHEMICAL QUALITIES OF SNAKE-POISON.

Snake-poison immediately after leaving the poison-gland is a thin, serous, albuminoid, yellow liquid of neutral reaction. On exposure to the air it quickly becomes viscid, assumes acid reaction, and finally becomes putrid with ammonia production. When the latter has ceased and can no longer be detected by the nose, the liquid, then slightly alkaline, still retains tonic properties, and it loses them only after an exposure of many months. Feoktistow found that freezing at 1° R. caused the poison to separate into a solid mass and a thin, very yellow liquid, which latter even at 4° R. remained liquid, and the poisonous action of which greatly exceeded that of the solid mass. Boiling diminishes, and when continued for any length of time completely destroys the potency of the poison. No micro-organisms exist in the fresh poison, but when introduced they live and thrive in it. Chemical analysis has thus far given us no clue as to the nature and action of snake-poison. Blyth claims to have separated the active, crystalline principle of cobra-poison, and has given a formula for its constituents; whilst Lucien Bonaparte separated from the poison of *Vipera Berus* a neutral, nitrogenous, gummy varnish, which he called echidmin or viperin, and which injected into animals produced the symptoms of viper-bite. These researches, however, are of comparatively little value, and it is doubtful whether chemistry will ever contribute anything towards the solution of the problem of snake-poison, or find a chemical antidote. In one direction only its researches might be of use, namely, in determining whether there is not a similarity in chemical composition between Ptyalin and snake-poison, and whether the latter does not play an important part in the digestive process of the animal, or merely serves the purpose of destroying animal life.

THE POISON-GLAND THE ANALOGUE OF THE PAROTID-GLAND OF WARM-BLOODED ANIMAL.

The gland secreting the snake-poison resembles both in position and structure the parotid-gland of warm-blooded animals. Its acini or alveoli are lined with a layer of secretory, columnar, finely granular cells, and arranged with great regularity along the excretory duct, that is, straight and cylindrical, and opens with vipers into the canal of the poison-fang, with our colubines into the narrow groove on the anterior surface of the fang.

SNAKE-POISON A NERVE-POISON.

From the fact that micro-organisms live and increase in a watery solution of snake-poison as they would in any other albuminoid liquid, and that its toxic effects become manifest only when ascending the scale of animal life, we meet with the first rudimentary development of a nervous system, it is legitimate to assume that snake-poison has special affinity to nerve-substance, and is a specific nerve-poison. That it causes no structural change in the nerve-substance, but produces merely functional derangement, is shown by the following experiments:—

Experiments to prove purely Functional Derangement without Structural Change.

1. Five drops of a 5 % solution of tigersnake-poison were injected subcutaneously at the back of a common snail after the heart had been laid bare. Its action, at first accelerated, became irregular and ceased altogether in five minutes, the animal at the same time becoming motionless. A preparation was then made from a small ganglion of this animal, showing both cells and fibres, and carefully compared under the microscope with one from the same ganglion of a healthy animal.

2. Ten drops of the same solution injected under the skin of an ordinary frog caused paresis of its hind legs in 30 minutes, and in 70 minutes complete paralysis, respiration becoming more and more difficult. The heart was then laid bare. Slow and feeble contractions continued for some time after respiration had ceased, and finally the heart stood still in diastole. Preparations from various parts of the nerve-centres were then carefully compared with similar ones from a healthy frog of the same size.

The microscope in either case revealed no difference between the nerve-cells and the nerve-fibres from the poisoned and those from the healthy animals.

RESULTS OF STRYCHNINE TREATMENT ON MAN DISPROVING STRUCTURAL CHANGE.

Apart, however, from these experiments the purely dynamic action of our snake-poison has been amply demonstrated by the results of the strychnine treatment of snake-bite, more especially in those cases in which general paralysis was complete and respiration and heart action had nearly if not entirely ceased when the antidote was administered. In these extreme cases, of which a number is on record, structural changes incompatible with life, if they occurred at all, would have set in, either in the nerve-tissue or the blood, and made recovery within a comparatively short time or immediately after the strychnine injections a matter of impossibility.

SNAKE-POISON A DEPRESSING NERVE-POISON ACTING ON MOTOR NERVE-CENTRES.

These valuable observations, made by competent experts in all parts of Australia, taken in conjunction with experiments on the lower animals, now place it beyond all doubt that the subtle animal poison furnished by our snakes is a depressing nerve-poison acting on the most important organs in the animal-economy, the motor nerve-cells, the functional activity of which it lowers and in fatal cases completely suspends without in any way altering the structure of the cells or effecting, by direct action, blood changes incompatible with life.

FEOKTISTOW'S EXPERIMENTAL RESEARCHES FULLY CONFIRMING
AUSTRALIAN CONCLUSIONS.

The writer had published his theory and practised the strychnine treatment for some time previous to Feoktistow's brochure appearing, but the conclusions the latter arrived at as the result of his experiments, though confirming Australian research, were altogether independent of it. Feoktistow proved that snake-poison does not destroy protoplasm nor interfere with infusorial life; that injected into the heart of a mollusc it causes almost immediate cessation of its action; that hypodermic injections produce in fishes contractions of the pigment cells, and bleaching of the integuments, followed by asphyxial respiration, general paralysis, and death. Similar effects were observed by him on frogs. On mammals the symptoms were dyspnoea, asphyxia, paresis, and paralysis of lower extremities, followed by general paralysis, sometimes tonic and clonic convulsions, hæmorrhages from bowels, lungs, nose, and bladder, and finally complete paralysis of respiration and of heart.

FEOKTISTOW EXPERIMENTING WITH VIPER-POISON ONLY.—IMPORTANT
CONCLUSION AS TO UNIFORMITY OF PRINCIPLE IN THE ACTION OF
POISON FROM VIPERS AND COLUBRINES.

Feoktistow's experiments will be frequently referred to hereafter, but one feature they present of special interest must be pointed out here. He experimented with the poison of *Vipera Berus*, *Vipera Ammodytes*, and *Crotalus durissus*, and all members of family *Viperidæ* and *Crotalidæ*. Now the poison of these snakes has hitherto been taken for a distinct and specific blood-poison, and yet Australian observations made on colubrids are identical in results with those of Feoktistow made on vipers. The theory that viper-poison is a specific blood-poison has been unquestioningly accepted by all investigators, and is even now held by most of them. The late Vincent Richards, in a controversy with the writer some years ago, expressed himself most emphatically on this point, maintaining that whilst the poison of the colubrid snakes affects the nervous system principally and the blood only partially, that of the vipers kills by poisoning the blood. Sir Joseph Fayrer expressed almost identical views in a paper on Snake-worship, &c., in India, which he read quite lately before the Victoria Institute, and which was submitted to the writer for comments. All authorities, in fact, Brunton, Eward, Weir Mitchell, stick to this blood-poison theory as an axiom not to be doubted, although it is completely disproved by Feoktistow, and all blood-change fully accounted for. But Feoktistow's conclusions being identical with those of Australian research, made on colubrids, with the exception of the death-adder, and the poison of the latter not differing materially in its effects from that of the colubrids, we may safely assume that all snake-poison is a nerve-poison, and acts according to one uniform principle.

ANTERIOR CORNUA OF THE SPINAL CORD FIRST AFFECTED.

The anterior cornua of the spinal cord are invariably the first of the nerve-centres attacked by the snake's poison, the affection beginning in the lumbar ganglia and taking an upward course. The lower extremities feel unnaturally heavy, and a paretic condition of the muscles supervenes simultaneously on both sides. The walk becomes unsteady and staggering, but by a powerful effect of the will persons in this condition are sometimes able to walk yet for some distance, especially if by prompt ligature and excision the absorption of the poison has been checked. Through still able to move

the legs in a sitting posture, they are unable to rise again, but ere long even sitting up becomes impossible, and they collapse helplessly. At this stage sensation is intact yet, and superficial reflexes, by pricking the skin, are still taking place. The upper extremities generally retain the power of voluntary motion even after the muscles of the neck have become paretic, and the head is held up with difficulty or sinks to one side. With birds, according to Feoktistow, the reverse is the case. The wings are usually first attacked, or paresis comes on in wings and legs at the same time.

INVASION OF THE MEDULLA OBLONGATA.—THE VASO-MOTOR CENTRE.

Whilst the voluntary muscles are thus brought under the sway of the poison, symptoms denoting the invasion of the medulla oblongata are rapidly developing. The first of these is the deadly pallor and ashy hue of the very cold skin, evidently due to the blood receding from the surface, a condition not unlike that obtaining in extreme anæmia, as persons in this state complain of an agonizing feeling about the heart and of deadly faintness; a paretic condition of the heart suggests itself as the most obvious cause, more especially when taken in conjunction with the small, frequent, and compressible pulse. But though the heart muscle is no doubt participating in the general paresis, the condition of the surface of the body is in reality one of anæmia. The blood at this early stage begins to accumulate in the large veins of the abdomen, and a condition of extreme engorgement is gradually brought about, identical with that observed in animals after section of the N. splanchnicus. This large vaso-motor nerve has its centre in the medulla oblongata, and paresis and paralysis of this centre must necessarily have the same effect as section of the nerve in any part of its course. The abdominal veins lose their "tension" and expand more and more, as paresis of the centre gradually becomes paralysis, until finally the greatest part of the blood mass is sucked up by the abdominal veins and becomes semi-stagnant there. Thus animals, after section of this nerve, and persons under the influence of snake-poison, are actually being "bled into their own bellies."

FEOKTISTOW'S EXPERIMENTS.

To Feoktistow belongs the merit of having demonstrated by a series of most interesting experiments how important a part paralysis of the splanchnicus plays among the symptoms of snake-poisoning. He has shown how slight intravenous injections of the poison produced quickly a high degree of paresis of the nerve, and a corresponding engorgement of the veins of the abdomen, whilst after lethal doses the paresis culminated within a few minutes in paralysis, extreme engorgement of the veins, followed by rapid collapse, excessive weakness of the bloodless heart, anæmia of the nerve centres and death. One experiment, which also proves the fallacy of the blood-poison theory, deserves special record here. The whole vascular system of a well-poisoned animal was thoroughly washed out with warm defibrinised blood of four animals of the same species, the blood being injected into the external jugular vein, and allowed to flow out of the crural artery. The latter was then closed, and blood exceeding the normal in quantity left in the animal. Nevertheless the nerve affection remained unchanged. Immediately after the artificial supply of blood ceased, the paralysed veins of the abdomen became engorged again with the whole, or nearly the whole, of the blood mass, leaving the rest of the body anæmic as before. This interesting experiment also shows how strong a hold the snake-

poison takes of the nerve-cells, when once it has thoroughly paralysed them, and how independent this paralysis is of the blood, persisting as it did after all the poison had been washed out of the animal.

THE CAUSES OF HEART-FAILURE.

The heart in vaso-motor paresis and paralysis is weakened in the first instance by the depressing action of the snake-poison on the vaso-motor centre in the medulla oblongata and the intracardial ganglia. Its pulsations, at first retarded in frequency, become accelerated soon after the introduction of the poison, the pulse-rate increasing rapidly, and the waves becoming smaller and more easily compressible in proportion to the frequency of the pulse, which generally counts 130 to 150 per minute at an early stage of the poisoning process. But an equally potent cause of heart-failure is its depletion by the simultaneous accumulation of the blood mass in the veins of the abdomen. Finally, to complete the mischief, we have not only anæmia of the oblongata, but the scanty blood supply it receives is also vitiated by an excess of carbonic acid, which increases in proportion to the oxyhæmoglobin disappearing. This blood change, which has given rise to the theory of blood-poisoning, is wholly and solely due to vaso-motor derangement. Both pulmonary and internal respiration are greatly interfered with through it, and the blood becomes almost stagnant in the engorged veins of the abdomen, the vis-a-tergo being quite inadequate to move it onwards. Thus the blood tends more and more to that thick tar-like condition which is observed after death from snake-bite. Under this powerful combination of causes, each of which is almost in itself sufficient to cause death, and which, moreover, are greatly intensified, as paresis gradually deepens into paralysis, the heart even of large animals succumbs in a comparatively short time, and death from paralysis of the heart and anæmia of the nerve-centres within an hour or two after a fatal dose of poison has been absorbed may be readily understood.

THE BLOOD-PRESSURE.

Observations at the bedside of a person suffering from snake-poison by means of the sphygmograph are scarcely feasible, but, though they are wanting, yet there can be no doubt that under the conditions just described the blood-pressure in a man at an early stage sinks to 0. Feoktistow's experiments show that even the smallest doses—0,020,04 mllgs. of dried poison pro kilo—injected into the vein of a cat almost immediately caused a fall in the blood-pressure without influencing either pulse or respiration; but 2 to 4 mllgs. were sufficient to reduce the blood-pressure to 0 and bring on collapse, infusions of blood only raising it temporarily. Of drugs raising the blood-pressure, he found ammonia to be the most effective, but only after small doses of the poison. After lethal ones it had no effect whatever on the blood-pressure, but greatly increased the hæmorrhages in all the internal organs. This important observation should be kept in mind by those who trust to ammonia in serious cases of snake-bite, and it probably applies also to the free use of alcohol.

THE HÆMORRHAGES.

The hæmorrhages accompanying snake-bite are no doubt caused by the reduced force of vaso-motor currents, and consequent changes in the capillary membrane, but of the nature of these changes we can as yet form surmises only, as the whole subject of vaso-motor paralysis and its influence on the

capillary circulation, as well as the general one, has never been properly investigated. The capillary membrane, though quite devoid of plain muscular fibres, is capable of dilatation and contraction, owing, it appears, to expansion and contraction of the nuclei of endothelial cells, of which it is principally composed. Variations in the lumen of the capillaries are usually accompanied by corresponding ones in the arterioles, and, as the latter are no doubt under the sway of vaso-motor currents, it is legitimate to assume that the circulation in the capillaries is likewise regulated by them—that strong ones contract, weak ones expand the capillary tubes, more especially as fibrils derived from non-medullated nerves terminate in small end butts in relation with the capillary membrane, and even small ganglia, in the region of the sympathetic at least, occur in the fibrils supplying the capillaries. Expansion, therefore, is no doubt the condition of the latter in snake-poisoning, aggravated by the simultaneous expansion of the arterioles and veins and consequent nervous engorgement. But capillary expansion, *per se*, does not necessarily lead to hæmorrhage, at least not in those capillaries, which in their normal state allow two or three corpuscles to pass through them side by side. But in the finest ones, permitting only single corpuscles to pass through in a row, one behind the other one, it is quite possible that blockage may take place through expansion making the tube too wide for one but not wide enough for two corpuscles abreast, and thus facilitating their being wedged in and blocking the passage. From a capillary tube thus closed hæmorrhage may occur in two ways—either the tender membrane bursts and allows the blood to flow out freely, or the blood corpuscles pass through the membrane by the process known as diapedesis. There are small slits in the cement substance connecting the endothelial cells, the so-called stomata and stigmata of Arnold, through which leucocytes are known to pass out of the vessel, and there is every reason to assume that these slits, enlarged by expansion of the capillary membrane, give exit to the blocked-up red corpuscles.

FEOKTISTOW'S OBSERVATIONS.

Feoktistow has carefully observed this interesting process of diapedesis. He sprinkled a 2 per cent. solution of the poison on the mesentery of an animal in a warm-air apparatus specially constructed for the purpose. Wherever a drop of the solution had fallen the vessels were seen to expand, and in a short time small, point-like effusions appeared, which gradually enlarged and finally becoming confluent formed a uniform hæmorrhagic surface. From these experiments it would appear that snake-poison paralyses the vaso-motor nerve-ends if brought into direct contact with them, though it is more consonant with its general affinity to nerve-cells to assume that paralysis emanated from the numerous small ganglia which occur in those nerve-ends.

HÆMORRHAGES RARE IN AUSTRALIA.

Hæmorrhages from Australian snake-poison are comparatively rare. Even at the place where the bite is inflicted there is, as a rule, very little swelling and effusion, and frequently none at all. What little there may be seems to disappear quickly after the strychnia injections. Only a few cases of blood-vomiting have been reported since the editor of *The Australasian Medical Gazette* has requested notes of all cases to be sent to him for publication. In one of these cases hæmatemesis set in soon after the bite, and was so considerable that one feels inclined to assume it emanated from actual rupture of the capillaries of the gastric mucous membrane, and not mere

diapedesis, and that general engorgement of the portal circulation brought it about. The viper-poison is specially productive of hæmorrhages, and effusions at and around the bite. We find the latter most frequently after death-adder-bite, but observations are entirely wanting yet as to the presence or absence of hæmorrhages in chest and abdomen, which Feoktistow observed on his animals, and which have been described in India as invariably following Russell's viper. More research is required here on the subject in general, and especially more records of carefully-conducted autopsies. Since the poisoning process is better understood now, and Australia has taken the lead in this hitherto obscure field of research, every practitioner should make it his special ambition to contribute his quota to our stock of knowledge, not only by reporting his successful cases, but also the *post-mortem* appearances, wherever practicable, in unsuccessful ones. It is not by experiments on animals, but by a hearty co-operation of all Australian medical men, that this subject will receive the elucidation so urgently called for. Indifference is despicable, and almost criminal.

THE RESPIRATORY CENTRE.

Parosis of the respiratory centre does not play so important a part in Australian snake-poisoning as it does after cobra and viper bite. The respirations become at an early stage quicker and shallower, but dyspnœa culminating in asphyxia is never observed, though apnœa finally takes place with the advent of general paralysis, and even precedes the complete cessation of heart-action by a few minutes. Australian snake-poison concentrates its action more on the vaso-motor than the respiratory centre.

FEOKTISTOW'S EXPERIMENTS.

Feoktistow ascertained that small intravenous injections of the fresh poison produced in cats a great increase in the frequency of respirations, that section of both vagi at once reduced this frequency, and that consequently small doses act as a stimulant of this centre. When repeated several times, however, the respirations were gradually retarded and asphyxia set in through paralysis of the centre. Large doses produced this effect at once without any previous acceleration. Very large ones paralysed respiration, heart, and vaso-motors almost simultaneously, and caused the blood-pressure to fall to 0. By the kymograph, respirations were found to be shallower in proportion to their frequency. As the latter were reduced they were at first deeper, but became shallow again, interrupted occasionally by spasmodic inspiration. Artificial respiration prolonged life for a short time only.

THE MOTOR-CENTRES OF CRANIAL NERVES.

Among the symptoms denoting paresis of the motor-centres of cranial nerves and sympathetic ganglia the first and most noteworthy is the early dilatation of the pupil. This truly pathognostic condition of the pupil is never absent, and becomes extreme when paresis has become intensified into paralysis. The most glaring light in immediate proximity to the eye-ball has no effect whatever on the pupil. If it remains dilated after strychnine injections have restored consciousness and the power to walk, it may be taken as a sure sign that the snake-poison is not completely counteracted, and will in all probability re-assert itself by a relapse, whilst a pupil restored to its normal condition justifies the conclusion that the person is safe. Another symptom is a marked change in the expression of the face. The features

become relaxed and lose their mimetic play ; the cornea is dull, and, together with the anterior surface of the eyeball, becomes dry, as the eyelids are moved with difficulty and the tears are in consequence not properly distributed over the conjunctiva ; the nostrils become immovable and the nasolabial fold is obliterated, whilst the lower lip hangs down ; the lips are apart, as the lower jaw is not held up by the muscles ; when paralysis supervenes, it drops entirely and the tongue protrudes. Deglutition, difficult in paresis, is completely suspended in the paralytic stage. The soft palate, pharynx, and œsophagus are then completely paralysed. Liquids forced on the person in this extremity may partly flow down the œsophagus, but will also enter the larynx, and their administration should be carefully avoided.

THE MOTOR-CENTRES OF CEREBELLUM AND BASAL GANGLIA.

We have no reason to assume that the motor-centres of the cerebellum and basal ganglia escape the action of snake-poison, thus far traced through the lower motor-centres, but the co-ordination and automatic regulation of the action of these lower centres, which is effected by the cerebellum and basal ganglia, must necessarily escape observation, when the motor centres of the spinal cord and medulla oblongata are in a condition of paresis and paralysis, and when at the same time the powerful currents of motor nerve-force that come to these centres from the motor cortical centres of the cerebrum are partially if not wholly withdrawn.

THE CORTICAL MOTOR-CENTRES OF THE CEREBRUM.

The early and complete subjugation of the psycho-motor centres is a unique feature in the effects of Australian snake-poison, and, however formidable it appears when it culminates in complete coma and paralysis, it is a perfect blessing when compared with the agonies of suffocation, the convulsions, hæmorrhages, &c., with consciousness only partially, if at all, impaired, which the victims of cobra and viper poison have to undergo before death ends their sufferings. With us, death from such poison is as easy as that from morphia or chloral, and almost invites the suicide who wants to rid himself of life in an easy and painless way without having the verdict of temporary insanity recorded against him by a coroner's jury. A successful interview with a vigorous tiger-snake will accomplish this purpose, and he may lay himself to rest under a shady gum-tree, to sleep the sleep from which there is no awakening in this mundane sphere. The functional depression of the motor cortical centres of the hemispheres, which supervenes in all but the very slightest cases of poisoning by our colubines, ranges from mere sleep, out of which the patient may be roused, to the deepest coma, with complete extinction of consciousness, entire absence of all reflex action and general paralysis. This is by far the most interesting of all the symptoms, not only to the medical man, but also to the psychologist. With its advent in the higher degrees, general paresis of the voluntary muscles and the organs governed by the vaso-motor centre is intensified into more or less complete paralysis, and at the same time the reduced force of motor-currents in the ideo-motor sphere, in the nerve-fibres connecting cell with cell, results in its lower degrees in sleep, in the higher ones in torpor and coma. The anæmia of the brain, previously referred to, no doubt aggravates this coma, but that it is principally due to paralysis of motor-nerve cells and consequent suspension of motor-nerve currents is plainly shown by the action of strychnine when subcutaneously injected even in the deepest coma bordering on

death, for invariably it reduces coma to sleep and quickly restores consciousness. These interesting facts are nothing short of experimental proof that the ideation—to use J. S. Mill's very appropriate term for the thought process—is accompanied, if not effected, by motor-nerve currents, and cannot be carried on without them. The modern idea of thought-waves, of which so much has been written of late, becomes much more intelligible in the light of these interesting phenomena, and we can even understand to some extent that silent transmission of ideas from brain to brain, which modern psychology has demonstrated as an undeniable fact, whilst some of the phenomena of hypnotism also have additional and much required light thrown on them. As the waves of sound caused by the vibrations of a certain string in a musical instrument set up the same vibrations in the corresponding string of another one, leaving the rest untouched, so we may conceive of thought-waves in the form of motor-nerve currents projected by a powerful will from certain cells or sets of cells in one brain striking a corresponding set in another brain, at the time in a passive or receptive condition, and there producing the same waves, and, as the result, corresponding ideas. But speculation on these interesting symptoms it would be out of place here to indulge in.

INVASION OF THE SENSORY SPHERE.

The sensory sphere remains comparatively unaffected in mild cases and in the early stages of more serious ones, but when paresis verges on paralysis sensation becomes blunted more and more, and with the advent of coma completely extinct. Even the nerves of special sense become completely insensible to all impressions from without, the eye staring vacantly into the most glaring light held close to it, the nose enduring strong ammonia vapour, and the ear being apparently deaf to any sound, whilst needles may be thrust deeply into the muscles without producing as much as a quiver. A temporary loss of sight sometimes occurs at an early stage, when sensorium and consciousness are still unclouded, but it passes off quickly.

THE REFLEXES.

It is hardly necessary to state that all reflex action ceases with the advent of coma. The total paralysis of the pupil, widely dilated and quite insensible to light, has already been described, and the importance of this symptom in the treatment with strychnine injections has been pointed out by the writer when treating of the paralysis of motor-centres of the cranial nerves.

FEOKTISTOW'S EXPERIMENTS.

Feoktistow observed increased reflex action at times previous to the extremities becoming paralysed. With regard to the restoration of suspended motor-reflexes his observations are strongly at variance with those made in Australia both on man and animals. Whilst in man the strychnine restores the reflexes quickly and completely, Feoktistow found even intravenous injections ineffectual on small animals, though his experiments on frogs and cats demonstrated the antagonism between snake-poison and strychnine. Strychnine-convulsions were almost immediately arrested by injections of snake-poison, and did not take place in frogs that had received a lethal dose of the latter poison, and in cats less violently. All the animals experimented on died; but as there is no mention made of the manner in which the experiments were conducted, it is difficult to account for this fact,

which caused Feoktistow, after strychnine had failed him, to despair of finding a physiological antidote for snake-poison. He appears to have injected a fatal dose of the latter poison, and immediately afterwards a corresponding one of strychnine. Under the warring action of two powerful poisons injected almost simultaneously, the motor nerve-centres of lower vertebrates appear to give way altogether, but whether a more gradual administration of the antidote would have a different result, the writer, not having made any experiments, is not prepared to assert. With regard to cats, however, he has convinced himself that, like dogs, they are very apt to die if the quantity of strychnine injected is ever so slightly in excess of the actual requirement. It appears to be of paramount importance that the strychnine is injected gradually and at intervals, the paralysed nerve-cells thus being by slow degrees freed from the torpor caused by the snake-poison, instead of receiving the shock of a large dose suddenly. To this circumstance, apparently, the success is due which has attended impromptu experiments made on domestic animals accidentally bitten by snakes. The injections in these cases were made in accordance with the directions for use of the antidote on man which were issued by the writer, and are contained in the pocket-cases now so largely sold throughout Australia.

Eighteen Months' Experience with Tuberculin.

J. W. SPRINGTHORPE, M.A., M.D., Melb.; M.R.C.P., Lond.

It is now some eighteen months since—on March 16th, 1891—I injected my first two patients with tuberculin. I have already, in Juno, 1891, and January and February, 1892, published progress reports upon the results of nine months' investigation, but there seems to me both appropriateness and advantage in bringing them up to date. Hence the present paper.

To conserve the time of members, and to prevent unnecessary repetition, I have placed upon the table copies of my Second Progress Report, which embodied the results of my nine months' work, together with a general résumé upon the matter up to the end of last year.

General Remarks.—To what is there written there is but little to be added from the general point of view. The practical abandonment of the treatment in very many quarters, even where it had been once favourably entertained, and more or less warmly praised, is well known to us all; but it can scarcely be either unexpected or inexplicable. Few English reports are to hand—though, as I am informed, a further paper from Hunter is shortly expected, naturally with more than interest. Again, Watson-Cheyne's recent statement as to its premature abandonment, illustrations of its continued use by phthisical physicians in the case of themselves, will have been read by most if not all. Recent information which I have received from Germany shows continued investigation by a number of eminently-qualified observers. Satisfied, now, however, to wait for results, and publish only after much longer trials, Koch himself continues to use his purified tuberculin, but will not entrust any of it to outsiders. Klebs has again praised the value of his modification, tuberculocidin, after more extended use. Libbertz, also, has moved to Hamburg, near Frankfort, where there is an excellent chemical institute, and this naturally suggests the further study of the treatment from the bacteriological chemistry point of view. Scattered papers from Russia and America need no present mention.

In myself continuing to investigate the value of tuberculin and derivatives, I am necessarily aware that I am adhering to what the vast majority of the profession has abandoned. But I continue for several, to me satisfactory, reasons. First, the specific power of the drug cannot be doubted. Experience may therefore open the key to the mystery of its maximum utility. Secondly, the lines along which the treatment proceeds seem the lines along which successful treatment is most likely to come. Thirdly, data must be gathered for the preparation of the final verdict, whatever it is to be. Lastly, good results are by no means uncommon, and the indications for usage are pressing for settlement. For these reasons I think it unwise to swing with the pendulum of medical opinion, from the extreme of our confidence to the extreme of premature neglect.

Before giving my own personal experience, I desire to add a few words to what appears in my former reports upon the general question. It will be

seen that I have throughout taken the constitutional factor in tubercular disease as the therapeutic goal, rather than the bacillary. To my mind, if you were to succeed in killing all bacilli present, but did not sterilize their habitat, you would simply render the question one of the possibility or otherwise of fresh infection, with a general result little if anything better than it is at present. Hence, to me, such criticism as Bristowe's, which condemned because of failure to kill the bacillus, is based upon grounds which are of little consequence. What should in my opinion be the aim is rather to permanently sterilize the soil. But who can say what is the specific element in the soil which renders it suitable to the growth of this particular bacillus? I find in Hare's "Therapeutics," in a valuable article by Solis Cohen, a list of theories advanced by more or less eminent authorities. It includes the following: A relative incapacity of heart and other viscera to the lungs (Rokitansky); bad construction and want of harmony of the organs of vegetative life (Richardson); general embryonic type of tissue with narrowing of lymph spaces (Formad); weakness of blood-cells, white and red (Salisbury); neurosis (Holland); absence of bactericide salts in the serum (Buchner); conditions removable and irremovable. And the results of any therapeutic interference with such conditions will naturally vary with the actual state of the case, which still remains in doubt.

Again, I give my results simply for what they are worth—that is, I give what followed in certain particular cases under certain conditions, and do not urge generalisation therefrom, until and unless they seem to warrant such extension. For phthisis, as I find it, is not, to put it mathematically, a definite quantity. It is rather a very indefinite quantity—varying almost from nothing to infinity. There are cases which only require the entry of the bacillus to prove fatal within a comparatively short period, and nothing but the destruction of the habitat would prevent the rapid extension of the disease. There are cases in which the slightest assistance to the system will lead to the arrested developments of the disease. And there is every gradation between. Had we any sure test as to the position of any given case in the series, the value of any line of treatment would become a matter of easy and early settlement. But we have no such test, and in the early stages especially—and these are the cases which any kind of treatment will benefit most—it becomes, practically, a matter of difficulty, often of impossibility, to know for some time whether the end was or was not materially aided by the interference on the part of one drug.

Lastly, as to the present procedure in the use of tuberculin. It is some satisfaction to me to find that both the dosage and the duration of treatment are not as at first practised, but proceed along lines similar to those which I had laid down for my own guidance from the outset, viz., much smaller doses and much longer administration. Another aim of administration remains as I mentioned fifteen months ago, not only local improvement to such degree as is possible in the individual case, but general defence, if possible to the extent of immunity, by the continuance of the treatment over a lengthy period. In this category it is interesting to notice that the drug in which many rely, who smile or even sneer at the use of tuberculin, viz., creasote, is now also recommended to be used for an almost indefinite period. Again, that much of the highest importance lies hidden in the bacteriological chemistry of tuberculin goes without further mention, and such modifications as Hunter's and Kleb's are worthy of far more study than they can possibly have yet had.

SUMMARY OF PERSONAL EXPERIENCE UP TO DATE.

Owing to exigencies of space, and the fact that the extensive tables which form the basis of what follows may be found in the *Australian Medical Journal*, January and February, 1892, it is necessary to refer to that Journal for the actual results which Dr. Springthorpe has obtained from the use of tuberculin and derivatives.

The cases in Class I all remain well. Similar cases since February have given similar good results. The case of Lupus remains better than he has been for years past, and several cases in Class II remain very markedly improved. It is Dr. Springthorpe's intention to report their further progress later on. Two cases have received over 200 injections during the eighteen months, and remain much better than when first treated.

Pearl-diving, from a Physician's point of view.

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IN order that the effect of this vocation upon those who follow it may be understood, it is necessary for me to explain somewhat fully the conditions pearl-diving imposes upon the diver.

Pearl-diving, as it is followed, consists in searching the sea-bottom for the large bivalve-shell known by the scientific name of the *Meleagrina Margaritifera*, which, when found, becomes the one article of export of this district. It is from this shell the substance known as mother-of-pearl is derived. The business is known locally as "pearl-shelling," or "shelling," but I have used the title "pearl-diving" because I think it is one better understood by most people. Pearls are also found in these shells, but the great object of the industry is the shell, and not the pearls.

Shell is found along most of the Queensland coast and on the north-west coast of Australia, but the locality in the vicinity and on either side of Cape York Peninsula and throughout Torres Straits is, together with the north-west coast, the place where it has been found, and still is found, in the most paying quantities. Speaking of this district, the sea-bottom from the Great Barrier Reef on the eastward, and the New Guinea coast to the northward, and away many miles to the eastward of Thursday Island, really forms the top of a vast plateau which has its surface varied by gullies, ravines, small crevices, and other inequalities similar to those found on dry land. These inequalities are often a serious affair for the diver working among them, for they sometimes slip down an unseen crevice and are precipitated from shallow to deep water. All over this extensive tract of sea the water is shallow, the depth ranging from 8-10 fathoms, occasionally deepening in basins to 80 fathoms. Upon the bottom are deposited in patches of a few or thousands the *Meleagrina Margaritifera*, to obtain which the trouble, risk, and expense of diving are undergone. The nature and formation of the bottom are found to vary as much as the quality of the soil and formation of the ground vary over a similar area of dry land. The nature of the bottom, has a considerable influence upon the life and growth of the shell. The search for the mother-of-pearl shell is conducted by divers clad in the usual helmet and diver's waterproof dress; the diver works from a small lugger or schooner of about 10-15 tons, in which the usual diver's air-pump is placed. The diver having gone from the lugger and reached the bottom, drifts along the ground at whatever rate the tide is going at that particular time. As he drifts along at the bottom of the sea the lugger drifts also, moved by the same force; thus, if the water be not too deep he may travel for miles, remaining below, as he sometimes does, for hours at a time. As he passes over the ground he, of course, is keeping a good look out for the material, by finding which he earns his living. As he takes up a pair of shell he places them in a bag which he carries for that purpose. The formation of the bottom is now an important thing for him, because if covered with small rocky hills, or intersected by deep cracks, he

has to take care not to become entangled in the first, or slip down the second. He, of course, is connected with the boat above by the india-rubber pipe which conveys the air to him, but he is also in communication with one of his crew, who is known as his "tender," by a rope called "the life-line." The "life-line" is his signal-rod, and by making a certain number of pulls or shakes he has things attended to for his welfare. In this way he obtains more or less air, as occasion demands, or more or less pipe. One of the greatest dangers to which he is exposed is the fouling of his air-pipe. If too much pipe is out the bight sweeps along the ground, and should that bight get caught by an inequality in the ground the man's life is in great jeopardy; he cannot go back to undo the loop unless the tide is weak or slack. The boat is pulling upon one end of the pipe and the man's body is at the other; he must cut his pipe and be hauled up as quickly as possible, or his life will pay the forfeit. The men are so careful as a rule that, although over 200 men are diving in these waters, very few lives have been lost. The races employed in diving operations are for the most part Malays, but Europeans and Japanese are engaged in it.

AS TO THE RESULT OF DIVING ON THE CONSTITUTION.

The great pressure of water upon the body, amounting, as it does often, to tons, causes the heart much extra work, and produces hypertrophy of the ventricles, but not to the extent of causing so much heart disease as I think one would reasonably expect to find among the men. Falling down a crevice, or being lowered suddenly from a lugger into deep water, endangers the tympanum, and sometimes cases are seen of permanent deafness caused by this accident, but this is most uncommon; I do not think I have seen three cases of the kind during over six years' experience. The complaint which troubles the men most is one to which they have given the name of "Rheumatics," and is experienced after deep-water-diving, say of 15 to 25 fathoms. It also appears to attack some men in shallower water who work too long or against a powerful current, or who do some heavy muscular action when under the influence of the pressure. The symptoms of the complaint appear as soon as the man gets on to the deck of the lugger after leaving the bottom. Generally, as soon as the diving-dress is removed, he experiences a sense of pain of a very intense tingling nature; it may be in his joints or in one of them, or in his limbs or in one of them, the pain being so intense that he shouts out so loudly as to be heard for a considerable distance away. His crew come to his assistance, and rub him with the various kinds of patent external applications. In one diver's case I am informed the galvanic current has been used, but this man is a European, and his experience must be quite exceptional. Electricity may be looked upon as quite an untried remedy. The ultimate result of an attack, such as that described, is that after rest and the use of such remedies as I have referred to the pains pass away, and the man returns to his work, keeping, however, away from hard work or deep water, until finding other men obtaining shell in larger quantities in the deeper water he is again tempted to go down in it. Occasionally the result of a continuance of the attacks or of a very severe case is "Locomotor Ataxia," but when the number of men employed is taken into account, and when the number who are seized with the nerve pains is considered, this stage is not often reached.

The treatment mentioned in the foregoing is that used by the men among themselves; but some of the employers who are interested in this business

live on the larger schooners, which serve to bring the provisions to the pearling fleet and to collect the shell taken each day, and they being constantly among their men, take such means as they have found beneficial for the relief of the symptoms. One gentleman tells me he has found hypodermic injections of tincture of opium for the pains, and hypodermic injections of liquor strychnia as nerve- tonic to be of the greatest benefit. He combines with this, as the painful feeling wears off, plenty of walking up and down the deck. There is very little, indeed I may say no opportunity for the physician to treat this disease in its earliest stages. It occurs out at sea, generally when the men are upon some fairly good deposit of shell, and when they will not leave it unless quite incapacitated. The cases that do come in to civilization are either so bad that they scarcely respond to treatment, or they are recovering and do not need any. As I have said, few become absolutely incapacitated, and unfortunately the coloured men are somewhat addicted to alcoholism, which interferes considerably with treatment if they do come away from the shelling-grounds. The following are a few of the examples of cases as they have been described to me by the persons who have suffered, or by employers who have noted the symptoms.

N.Q., a Japanese, gives the following as an experience when diving in water which was not very deep, but which at that particular place ran in a very strong current:—"I went into the water at half-past 2 and worked hard for one hour and a half on the bottom; during all this time I felt comfortable and as well as usual. As soon as I came up, and got on the deck of the lugger, and took off my dress I noticed the forefinger of my right hand was sore; as I got completely out of the dress this soreness began to extend up my arm and through the whole of my body. The pain gradually became worse and worse, until at last all my body felt so bad that I could scarcely stand it. After a few hours of great torture it gradually abated, although my sufferings through the night were very intense. By 8 a.m. of the next day the pain had ceased, and the sensation that remained was one of pins scratching me all over; it was quite bad enough, and I was very glad when my master came, as he gave me some medicine which took away this sensation, except a little left in my legs. I was not quite right until two weeks had passed, and then I felt quite well without any pain or stiffness." By "working hard," I understand this man to have been walking up against a strong current. In this case the man was treated by his employer with a hypodermic injection of tincture of opium, the dose being, I think, 6 minims.

N.H., relates that he has been diving for about three years, generally in 12 fathoms of water. He was not for a long time affected by his calling, although he was beyond 30 when he first began to follow it. Lately he took to working in 16 fathoms, and soon found that on coming up and taking off the diving apparatus he began to suffer pain in the right shoulder, and this pain was quickly followed by pains in the knees and small of the back, which were intensified by movement. After a week these pains only troubled him on movement, and he tried complete rest, without it, however, doing him any good. For this man Liq. Strychnia in two minim doses was used and the electric battery, but without any improvement in the symptoms; he was also put on full doses of bromide of potassium. His visual organs were not affected. His symptoms gradually passed away.

J.T., aged 33, a Manillaman, of a short thick-set build, has been diving for five years. First had the "rheumatics" four years ago, and has had it seven times

sinco. On the first occasion he was working in only 10 fathoms of water, and it came on a little. The sensation came on when he was out of the water and taking off the dress; it did not at that time last very long, and was not very severe. The other attacks took place at long intervals; they were more severe, but the water he was diving in was deeper. He always had the limbs that were affected well rubbed with St. Jacob's oil, but could not say whether it did him any good. Finally got the attack from which he has not properly recovered when diving in 22 fathoms of water. While working on the bottom he felt quite well; on signalling the tender to haul him up he was immediately taken from the bottom to the top, and as soon as the dress was removed his illness began. It first showed itself by a severe pain in the right cheek, just as though he had been struck hard by a man's fist; this symptom did not remain long by itself. It was quickly followed by a pain, which went down the right arm and was now excruciating. It remained in that way for a few hours, and then a noise like boiling water suddenly made its appearance in the right ear; in a few days the right eye became affected. The vision on that side became very much impaired, and was so for some weeks. The pain gradually all went away, or nearly away, and now the only thing left is the noise in the ear, which does not go away. The eye, though still somewhat weaker than the other, is pretty right. Sleeps quite well. This man was not treated at all—in fact, I never saw him until he was about as well as he now is.

L—, a Manillaman, aged 31, experienced diver, has suffered from slight trembling in the muscles of the legs when diving in deep water. On the advent of this he took care to stay down on the bottom only a very short time, as he had heard of this coming on in some countrymen, and then afterwards he heard they got the rheumatics. He never had his ears affected nor his eyesight altered; he never had an attack of "rheumatics," such as other divers had, and attributed his escape to his having always worked shorter time. He never treated himself with anything.

N—, a diver of some years' experience, had been troubled with the "rheumatics" several times; once or twice he was very badly affected. Noticed that he had sometimes seen two things where he knew there was only one; this was when he was not affected by the disease, but it came on soon after. It always came on badly as soon as the dress was taken off and the cold wind blew on his skin. The pain is a bad pain; cannot say what it is like; it is very sore, but not to the touch. Has been often rubbed, and thinks it did good; is not sure. Found that he was attacked with the pain in shallow water if he worked very hard; by shallow water 10 or 12 fathoms were meant. He found that lifting anything, or making an exertion with one of his limbs more than ordinary, often induced an attack of "rheumatics" in that limb. Never took anything for it. This man is a coloured man.

P—, has been diving many years in deep water and all kinds; finds that trying to stay down too long is what brings on the disease. It always came on after he got on to the boat. Always felt very warm when he came up, and always found the disease attacked him when he took off the dress. Had found his legs shake sometimes, but not often, before the attack began. Had got the disease in one arm by lifting up his bag of shell into the boat. It did not remain very long.

H.H.—is a European of muscular development; has not had much experience as a diver, as he only worked properly for about one month prior to his being affected by his present complaint. Is 40 years of age, and

during the first month worked in from 12 to 15 fathoms of water. Had not experienced any peculiar sensations whatever. Had no twitchings of his legs nor of his eyelids or lips. During last August he went prospecting for shell, and went down in what he judges would be about 25-fathom water; could not be quite sure of the depth, because when he put his plumper-line over it was all taken up, and some more line which he attached made 25-26 fathoms of line out before the lead touched bottom; that would be greater than the depth actually was, because of the rate the boat was drifting at. He went down and examined the bottom about three times altogether, not remaining very long each time, as he found the bottom hardly suitable for the growth of shell. The first time he went down he found that the boat was drifting so fast that he could hardly keep up with it as he walked over the bottom. He signalled to be hauled up, which was done very quickly; he shot up all the quicker because he did not open his spring-valve, and thereby his dress was ballooned. When he reached the surface of the water he was placed with his head below the level of his feet and his helmet and corslet got shifted a bit and inconvenienced him. In trying to put them right he cricked the lower part of his back. He continued at work in the 20-fathom water for three more dips, after which he went to the shallower parts and worked on until 12:30; he then knocked off, and noticed that there was some sensation of pain in the loins. Did not work again, but remained on the grounds. The pain slowly increased, and in ten days was so severe he had to have hot flannels applied. The pains did not then affect his legs in any way, but now they are in the back of his thighs. The pain is bad when he attempts to move about, but is not troublesome so long as he remains quiet and at rest.

THE CAUSE OF THE APPEARANCE OF THE PAIN.

From the few examples just given, it seems certain that the pains begin after the pressure of the water has been removed from the diver by his return to the normal condition of life. The greatness of this pressure may be calculated by remembering that the total weight of the diver is 20 stone, (made up thus: his own weight, 12 stone; carried weights, placed upon the head in the form of the helmet, upon the back and breast in the form of corslet and leads, and upon the feet in the form of leads, 8 stone), and knowing the depth to which he goes. After diving in 12 fathoms for three hours on a stretch, and returning to the surface, any creasing in the undergarment will be found to be deeply impressed into the skin. The pressure is being exerted everywhere on the external surface of the body, either directly by the water-weight pushing the dress against the skin, or indirectly by the water-weight being transmitted through a buffer of air to the skin, for we must remember that the air which is being breathed is being forced through the helmet, and out at the escape-valve in the side of the helmet, against whatever the water-pressure at the depth may be. From this it follows that the pressure must therefore be kept up in the vessels of the lungs by this indirect way, while the vessels of the trunk and limbs receive their share of pressure by the direct way. The lungs are, in a measure, protected from direct pressure by the body framework with which they are surrounded. The brain and spinal cord only do not receive pressure, except in the following way: The whole of the body being subjected to such a compression is no doubt reduced considerably in bulk, so that the cubic space in which the blood is normally confined becomes much reduced, and since there is no counter-balancing external pressure upon the brain and

cord, undue expansion may take place in the capillary vessels of those organs. The point at which that undue expansion takes place must depend upon the constitution of the individual himself, some men's vessels being more capable of resisting undue expansion than other men's. I know that whether more than a fixed proportion of blood can reach the brain or not is a matter about which considerable difference of opinion has been expressed in the past, but from the results of deep-water diving upon the visual and other organs it seems to me that passive cerebral hyperæmia is not infrequent with persons engaged in this calling. If the individual is young, as most are, and his capillary vessels good enough, they recover by complete rest. The nervous disturbances then disappear, and he returns to work not to be troubled again until he oversteps the balance of power, and backs his vascular system against a certain number of fathoms of water. When the same thing happens in the case of the spinal cord recovery is less frequent, though in this case also I think it is by far the most usual termination.

The pain in the limbs to which the name "rheumatics" is given is, excepting those cases in which it is plainly evidenced to be due to some lesion in the cord, caused in this way, I believe: The great pressure upon the limbs produces a slight anæmia of the large nerve-trunks during the first few minutes of working under water. This temporary anæmia is soon overcome by the heart's force, whereupon the blood circulates in sufficient quantity to enable the nerves to perform their functions. When the diver is hauled quickly, as he is, from the bottom to the deck of his lugger, the sudden removing of the pressure from the capillaries of the nerves causes them to dilate, and so destroys the natural circulation of the blood through the nervous tissue, producing a state of hyperæmia, and causing the painful affections which, from their similarity to the pain of rheumatism, those whose lot it is to endure them have dubbed "rheumatic." The fact that excessive hard work under water greatly conduces to the severity and frequency of the attacks seems to me to maintain the hyperæmic theory of the cause of the pain; over-work, requiring the nerve stimulus to be sent along the nervous cords under such pressure in the capillaries, would increase the liability to hyperæmia of the part.

The medical treatment of this complaint is for the most part in the hands of the sufferers themselves. Situated as they are at sea, away from civilization, they are glad to adopt any remedy which promises to afford immediate relief. The cessation from work for a week or a fortnight is what probably does them the most good, although during the rest they try many things, to each of which they attribute more or less curative powers. To induce them to come away from the shelling-ground, if shell is being obtained in quantity, is, unless they are actually *in extremis*, a very difficult matter; when coming away may mean eight or ten days' loss of time it is easy to understand why they try to hang on until the symptoms pass off.

With the exception of the action of the pressure upon the nervous system, I think diving may be looked upon as a fairly healthy, though somewhat risky, occupation. The heart, as I have said, is somewhat affected, and has a tendency to become hypertrophied.

Treatment of Hepatic Colic by the administration of Olive-oil.

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IN this paper I desire to draw attention to a plan of treatment of Gall-stone Colic which I have found almost invariably successful. My attention was first called to it twenty years ago, but I believe it was first suggested by Dr. Cole. It is, therefore, not a new method of treatment; nevertheless, its great value is unknown to many members of the profession, and denied by others.

Murchison, Fagge, and Roberts, in their classical works on medicine, make no mention of it; and Ringer and Lauder Brunton, in their works on therapeutics, are silent upon the matter. Dr. George Harley, in his work on diseases of the liver, merely remarks that olive-oil is given with good effect in gall-stones. Dr. Goodheart, in a recent article in the *Lancet*, relates four cases which were cured by the administration of the oil; but he does not appear to be aware that it has been largely and successfully employed by others. Professor Shauffard, of Paris, pronounces against the method, affirming that the green masses which patients pass whilst taking the oil are not gall-stones, but composed of neutral fats and free fatty acids, with but a small proportion of cholesterine. Dr. W. Osler, in his book on the "Principles and Practice of Medicine," published only this year, says, "Olive-oil has proved useless in my hands."

On the other hand, the value of the method has been recognised by Professor Germain See, who says, in a number of "*La Médecine Moderne*," that "clinical experience proves that the administration of olive-oil both promotes the removal of gall-stones, and relieves the attendant pain and jaundice." Rosenberg, in the "*Gazette Hebdomadaire*," records three successful cases, one of which had been suffering for years, and treated without result; the third case had been suffering for nine years, unrelieved by many "cures" at Marienbad and Carlsbad. Of twenty-one cases, collected by Rosenberg, treated with olive-oil, in only two did it fail. He mentions, on the authority of Cantani, that in Italy, where olive-oil is taken largely as an article of diet, gall-stone is less frequent than in other countries. M. Willemmin, in the "*Bulletin General de Therapeutique*" for July 8th, 1891, mentions nine cases in which olive-oil actually averted an attack of biliary colic in a few minutes.

Lastly, the "Therapeutic Section of the Philadelphia Policlinic Medical Society" reports the results of a collective investigation, from which it

appears that of fifty-four cases in which the oil was administered, in fifty—that is about 93 per cent.—positive relief was afforded; two died, but in one of these there was adhesive obstruction of the biliary ducts, and it was, therefore, beyond the help of treatment of any kind. Two of the observers stated that they had treated forty other cases of biliary colic in the same way without a failure, but, unfortunately, without keeping an accurate record of them.

Let me sketch the class of case in which this treatment is so successful, and I think it desirable to do so, because I have so frequently found the nature of the disease to be unrecognised.

The patient complains of frequently-recurring attacks of violent pain, situated below the right costal edge, and radiating to the back and shoulders. It comes on gradually or suddenly, is of an agonising character, causes a feeling of faintness, with cold perspiration. It is often relieved by vomiting, and may cease quite suddenly. The next day, if the attack should have lasted several hours, the conjunctivæ, if carefully examined, will be found to be of a yellowish tinge, and within two or three days jaundice may be quite pronounced, the urine charged with bile pigment, and the feces of a light clay colour. The pain and the jaundice are of different degrees of intensity in different cases, and the latter may be so slight as to escape observation unless very carefully looked for. On the other hand, the attacks may be of such frequent occurrence that the jaundice is intense and persistent. After the attack the patient complains of weakness and languor, and there is some engorgement and tenderness of the liver on palpation. In a variable time—a few days, weeks, or months—the patient is affected in exactly the same way, and sometimes the attacks are so frequent, and extend over so lengthy a period, that the patient loses flesh, looks cachectic, and his appearance may even excite the suspicion of malignant disease.

The plan of treatment which I adopt is as follows:—Morphia or chloroform is administered during the violence of the seizure. Next day, or as soon as possible, a half-grain podophyllin pill is given at night, and on the following day as much salad oil as may be sufficient to produce three or four loose evacuations. Very soon green masses will be found floating on the surface of the water, into which I direct the patient to pass all his motions. These masses vary in size from a pea to a walnut, and in number from one or two to scores. This treatment is kept up for five or six days, and repeated at intervals of a week or ten days, until the green masses are no longer seen in the motions. During the whole of the time the patient is taking the pills and oil I direct him to take liquid nourishment only. The relief to pain and the removal of the jaundice is most marked. Very often no repetition of the treatment is required. In some cases the patient may need to resort to it several times.

I claim for this treatment that not only does it afford the patient complete relief from immediate suffering, but that in a very large proportion of cases, as the table appended to this paper will show, he remains permanently free from his trouble.

The table* gives 35 cases which have occurred in my practice since 1876, and of which I have full notes. I have seen many more in consultation and

* Vide page 178.

in my own practice, but most of these were seen prior to the year 1876, and I have no record of them. I have succeeded in tracing the subsequent history of twenty-five of the thirty-five patients:—

One was quite well 4 months after treatment.				
One	„	5	„	„
Two were	„	6	„	„
Three „	„	8	„	„
One was	„	15	„	„
Two were	„	2 years	„	„
Three „	„	5	„	„
Three „	„	6	„	„
One was	„	9	„	„
Three were	„	10	„	„
One was	„	11	„	„
Two were	„	12	„	„
One was	„	13	„	„
One „	„	16	„	„

We have then a percentage of 71·4 known to be quite well at the several periods mentioned. Of the remaining ten cases, six could not be heard of at the time of this inquiry, and of these, two were seen but once only, and four were under observation for three or four days only, but passed many green masses. One died in the Blue Mountains, but obtained rapid relief from the oil at first. Three patients had a recurrence of the attack at six, five, and six months respectively. It is fair to presume that of the six that could not be traced, four, or 71·4 per cent., were cured, and we then have twenty-nine cases out of thirty-five, or 80 per cent., absolutely cured. I do not think that under any other plan of treatment has so great a degree of success been obtained. Even if the patients had not been permanently cured, the great relief obtained by the administration of the oil would render it a most valuable remedy. It will be observed that some of these patients had been suffering for many months before they came under my care.

Objections to the method of treatment have been raised on the ground that the green masses are not gall-stones, an affirmation which has certainly not been proved. It is said that the masses are nothing more than saponified oil, or than neutral fats, and free fatty acids, with but a small proportion of cholesterine.

On the other hand, Professor Ramsay, of Bristol, says that—“They are not a soap, but chiefly olive-oil full of small crystals, which may or may not be cholesterine.” Rosenberg found experimentally that, in dogs, if kept upon a normal diet and dosed with olive-oil, a considerable augmentation of the biliary secretion, especially of its fluid part, takes place, and that there is also a considerable increase of fatty acids, which are capable of dissolving cholesterine, and in *The Practitioner* for March, 1891, it is stated that—“Olive oil is a powerful agent in the treatment of hepatic colic by supplying the fatty acids which dissolve the cholesterine of the gall-stones. It was used for some time empirically, and now physiology has indicated the reason of its

success." Virchow, in the discussion which followed the reading of Rosenberg's paper at the Berlin Medical Society, said that he believed the oil was absorbed from the intestines and re-secreted by the liver with the bile, and that thus the biliary ducts were washed out by the oil.

I would ask those who assert that the green masses are not gall-stones to explain the following facts:—

- (a) Patients not suffering from gall-stones to whom olive-oil has been given do not pass green masses.
- (b) Patients, the subject of gall-stones, and to whom the oil has been freely administered, after a time, cease to pass green masses, notwithstanding the continued administration of the oil.
- (c) Patients who have been suffering for years, and tried many cures without avail, on taking the oil have passed numerous green masses, and remained thereafter permanently free from attacks.
- (d) During the administration of the oil to gall-stone patients, calculi in the condition in which we find them in the gall-bladder *post mortem*, and in which they are sometimes passed under other modes of treatment, are never seen.

Of course, in cases in which a stone is tightly impacted in the common or cystic duct, neither this nor any other form of purely medical treatment can do good; the cure then becomes a surgical one, but in the class of cases which I have described the olive-oil treatment is well nigh a panacea.

The want of success which some who have tried this treatment have had is, I am disposed to believe, attributable to the administration of the oil in too small quantity; sufficient must be given to produce four or five loose evacuations daily.

In conclusion, I may say that I have for many years used the ordinary grocers' salad-oil in preference to the olive-oil sold in the chemists' shops.

TABLE of Cases of Hepatic Colic referred to in the foregoing paper.

No.	Age	Sex.	How long suffering.	Was under treatment.	Last seen or heard of.	Jaundice.	Green masses passed.	Remarks.
1	52	F.	.....	5 December, 1876 ..	Not seen again	.....	.....	Was quite well from March to July, then got another attack ; rapid relief.
2	29	F.	6 weeks..	1 to 27 March, 1877, and second time 6 October, 1877.	11 Oct., 1877.	Yes	Numerous.	
3	27	F.	Several months.	6 to 30 September, 1878; second attack 6 April, 1880.	17 Mar., 1881	"	"	Heard of as lately as 1890, and had had no return of gall-stone colic.
4	53	M.	3 months	7 to 23 September, 1878.	3 Oct., 1878.	"	"	Got rapid relief from pain, and jaundice disappeared, but three weeks later return of attack with jaundice. I prescribed same treatment and saw no more of him, but heard a week later that he was very weak and feverish, and a few days later still heard that he died.
5	49	M.	2 years ..	1 to 25 May, 1879 ..	26 Aug., 1890.	"	"	I had frequent opportunities up to last year of seeing this patient for other ailments, but he never exhibited slightest indication of gall-stone trouble.
6	58	M.	.....	17 January, 1879; second attack on 6 May, 1880.	21 June, 1892.	.....	Several.....	Perfect relief after first attack. Not seen after second attack, but heard from him on 21st June, 1892, that nothing did him any good until he took a piece of alum, which cured him at once.
7	25	M.	4 years ..	7 to 16 August, 1879	31 Mar., 1880.	Yes	Numerous.	No return of attack.
8	59	M.	16 months	4 to 18 Dec., 1879 ..	Several years after attack.	"	"	I saw this patient some time afterwards ; he remained quite well.
9	42	F.	3 years ..	8 December, 1879 ..	30 July, 1892	" ....	.....	I saw this patient but once, but heard from her husband on 30th July, 1892, that she had not had an attack since I prescribed for her thirteen years before.
10	33	F.	9 months	2 to 18 January, 1880.	1891	"	Numerous.	This patient had been jaundiced for five months before she came under my care. She had to take the oil for some time, but ultimately got quite well, and has remained so up to the present time.
11	72	F.	.....	25 May, 1880 ...	May, 1886 ..	" ....	.....	I did not see this patient, but prescribed the oil for her on husband's account of the attacks. Heard from the husband on 25th June, 1892, that his wife remained absolutely free from gall-stone colic up to the time of her death, in 1886, from supposed cancer of the liver.
12	56	M.	2 years ..	10 June, 1880	6 Aug., 1892..	" ....	.....	Saw this patient but once, but, in reply to a letter from me, he said, on 6th August, 1892, that he had but one attack after I prescribed for him.
13	18½	F.	2 months	5 to 25 October, 1880	25 Oct., 1880.	"	Numerous.	This patient had also aortic incompetency ; got perfect relief from pain with the oil
14	61	F.	20 years ..	18 Jan., 1881 ; 11 Feb. ; 4 April, 1881	4 April, 1881	"	"	No reply to my letter of July, 1892.
15	32	F.	6 "	21 June, 1882.....	23 June, 1882.	.....	None.....	On 22nd June, 1892, Mrs. T. wrote stating that she had one or two attacks after consulting me, but none now for years.—"Suffered a martyrdom before consulting me."
16	51	F.	For years.	26 October, 1882 ..	22 " 1892.	.....	No record..	Got great relief from the treatment.
17	47	F.	Some months.	30 January, 1883 ..	5 Feb., 1883.	.....	Numerous.	Got great relief from the treatment.
18	32	F.	1 month.	2 to 12 February, 1883.	4 Aug., 1892.	Yes	"	4th August, 1892, letter from Mr. H., stating that his wife did not suffer again from the gall-stone, and that marked improvement in her general health followed ; she had grown quite stout. Fifteen years before she suffered from gall-stone she had an abscess of the liver.

TABLE of Cases—continued.

No.	Age	Sex	How long suffering.	Was under treatment.	Last seen or heard of.	Jaundice.	Green masses passed.	Remarks.
19	55	M.	.....	6 March, 1883.....	Not seen again	Yes ....	.....	No reply to my letter.
20	20	F.	3 months	11 November, 1886.	.....	Frequent attacks.	Numerous.	Patient of Dr. Pickburn. Called upon her in August, 1892, and found her quite well; she had had no attack since January, 1887.
21	32	M.	Some months.	30 November, 1888.	.....	Yes	Numerous.	This man was a patient of Dr. Hankins. His liver was a good deal engorged and somewhat enlarged, exciting a suspicion of malignant disease. He got great relief from the oil, and ultimately got quite well, but took some other medicine.
22	40	F.	6 months	17 January 1887 ..	4 Feb., 1887.	"	" "	No answer to my letter.
23	44	F.	Many months.	20 April, 1887.....	April, 1892 ..	"	" "	Saw her three years after, and was quite well. Heard of her in April, 1892, and was then quite well.
24	41	F.	3½ years.	7 to 25 May, 1887 ..	1 June, 1891..	"	Yes	Had ten violent attacks before came under my care. When I saw her in June, 1891, for another ailment, informed me that she had never had a return of the colic.
25	60	F.	1 month	6 Oct. to 20 Dec., 1887.	9 Jan., 1888..	"	Many	Got quite rid of her pain and jaundice.
26	22	F.	Several months.	11 Nov., 1887	1 Aug., 1892..	.....	" "	In letter, 1st August, 1892, she says, "Cure was permanently successful."
27	45	F.	1 year ..	16 to 21 April, 1888	16 June, 1892	Yes	A few	16th June, 1892, letter from Dr. Stapleton, who sent her to me, stating that patient was benefited by the treatment; that she remained in Lambton for several months, and then left the district. Dr. S. was not called upon to treat her for the colic after her return from Sydney.
28	53	F.	3 years ..	29 May to 30 June, 1891.	4 Aug., 1892..	"	Numerous..	This patient had as many as forty-five attacks in the year 1890. In letter of date 4th August, 1892, she had remained entirely free from symptoms ever since she was under my care.
29	46	F.	For years	27 January, 1892 ..	2 June, 1892..	"	Very numerous	Patient of Dr. Young, who informed me, on 2nd June, 1892, that she had got quite well. She had had many attacks before adopting the olive-oil treatment. In the same letter Dr. Y. says another case with the same symptoms did equally well under the oil treatment.
30	40	F.	5 months	4 March, 1892.....	18 " 1892...	"	Numerous	In June, 1892, Dr. Murray, whose patient she is, informed me that she got great relief from the treatment. In August, however, she had some symptoms, which might be due to gall-stone, but were possibly caused by a movable right kidney.
31	52	F.	2 years..	10 March to 11 July, 1892.	13 Aug., 1892	"	Very numerous	In this case the gall-bladder was so full of calculi that it formed a hard mass, which created some suspicion of malignant disease. Under the continued use of the oil, however, this mass entirely disappeared. The attacks of pain were accompanied by a rise of temperature, 103 and even 104. In a letter received from her 13th August, 1892, she says, "I have had no return of the attacks, and enjoy fairly good health." Mr. Fitzgerald saw this case in Melbourne, before she came under my care.
32	23	F.	Months...	About 1870	1875	"	No record..	When I saw her, in 1875, she had been quite free from attacks for four years, and was in good health.
33	58	F.	"	1830	1890	"	" "	When seen in 1890 for another ailment, had been free from gall-stone colic for years.
34	45	F.	Weeks ..	1890 .....	.....	" ....	Numerous.	Patient of Mr. Twyman. Got rapid and permanent relief.
35	65	F.	" ..	1881	1883	"	" "	Had no return of attack.

A Case of Serous Ascites converted into Chylous Ascites.

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As I can find scarcely any allusion to chylous ascites in works on medicine, I venture to bring under your notice a case occurring in a young woman, in whom the effusion, which was originally serous, and which was believed to be due to cirrhosis of the liver, after a time became chyliform in character.

Annie H—, aged 26, single, a domestic servant, was originally admitted into the Hope ward of the Adelaide Hospital, under the care of Dr. Way, in December, 1888, for an abdominal swelling, which had been noticed for over two months, having commenced originally in the flanks. It was associated with œdema of the feet after walking, with looseness of the bowels, scantiness of urine, and general emaciation. From the girl's mother it was ascertained that she had been in the habit of drinking intoxicants freely for more than two years. At the time of admission she was described as having a moderate amount of ascitic fluid, a slight icteric tint, and a liver fulness, commencing at the fifth rib in the nipple-line; a systolic apex bruit and distension of the superficial thoracic veins were also noted, but no anasarca of the lower limbs, and no albuminuria. She was tapped with a Southey's trochar and cannula, and $5\frac{1}{2}$ pints of ordinary serum were drawn off in about three hours, after which the liver was felt below the ribs, hard, resistant, and yielding a friction fremitus on palpation; the diagnosis then arrived at was "cirrhosis of the liver with some chronic peritonitis," by which was meant in all probability perihepatitis. She left the hospital in a couple of months relieved, and remained for over a year in a stationary condition, but was re-admitted under my care for a month in May, 1890, and during that period was tapped twice, her girth being thereby reduced from 42 inches to $36\frac{1}{2}$ inches. The specific gravity of the fluid, which was still serous, was 1,018, and on the last occasion flakes of lymph were noticed in it. The liver now reached from the fifth space to a hand breadth below the thoracic margin. Jaundice was absent, but before re-admission she had passed blood by the bowels, though no piles were seen externally. She left the hospital for a few months, and again came into my ward on September 9th, 1890, sallow and faintly jaundiced, with an abdominal girth of $46\frac{1}{2}$ inches, and with œdema of the legs of a week's standing; the urine was non-albuminous, and its specific gravity 1,022. The day following she was tapped, and 17 pints of fluid drawn off, and a note made, "that the fluid contained flakes of lymph, and was slightly puriform in appearance, pus-cells being seen under the microscope"; the œdema of the legs rapidly subsided, and patient was treated with copaiba; eight days later, 18th September, $10\frac{1}{2}$ pints more were drawn off, when the fluid was found to be quite milky in appearance; it was examined by Miss L. M. Fowler, then Clinical Clerk, who found that it had a faintly-yellow "milky" appearance, and that after 24 hours there was no deposit. It was neutral in reaction,

and had a specific gravity of 1,008; it passed unaltered through filter-paper; it became somewhat clearer after boiling, partial coagulation taking place; a fatty extract was obtained on shaking up with ether, the residue then becoming clearer (thinner); there was abundant albumen by the cold nitric acid test; under the microscope were seen numerous irregularly-shaped granules, and a few cells resembling leucocytes—the flakes floating in the fluid, resembling mucus, also showed under the microscope a fibrillar structure with the granular cells entangled in it.

On 27th November she was again tapped, and $12\frac{1}{2}$ pints drawn off, precisely similar in character; she was then discharged at her own wish, but taken back in less than a fortnight, not on account of any increase in girth, for she only measured $33\frac{1}{4}$ inches, but because she was said to have had a fit; her urine was found to contain neither albumen nor sugar; its specific gravity was 1,013; it was not then, or at any time, chylous, but quite clear, although noticed to stain her linen. It was alkaline, and deposited triple phosphates and mucus; she was delirious and noisy; had incontinence of urine, and was slightly jaundiced in tint; these symptoms, which were attended with but slight fever (100 degrees), passed off in three or four days; the abdomen increased in size, until on 10th January, 1891, it measured 41 inches, when $13\frac{1}{2}$ pints of slightly yellowish milky fluid, with a specific gravity of 1,010, were drawn off; this reduced her girth to 36 inches, and she went home. She came in for the last time on 25th February, measuring 45 inches, and on the 28th was tapped to 21 pints, the fluid, probably from a slight accidental admixture of blood, having a crushed strawberry tint. The elaborate report of Dr. W. A. Verec (to whom I desire to acknowledge my indebtedness) is appended in full.

The patient left the hospital on 23rd March, 1891, and I ascertained the following particulars of her subsequently from Nurse "Hope":—"As well as I can remember, patient lived four or five months after leaving the hospital; she came in on two or three occasions for medicine; the abdomen had not refilled as on previous occasions, but remained only a little larger than when she left the hospital; her mother stated that she partook freely of intoxicants; on the day before her death patient was quite as well and bright as usual, and had got her clothes ready for coming up to the hospital the following day; she seemed restless, and not very well during the night, and became worse towards morning, but was only really very ill for two or three hours; she used to get 'bad turns' of some sort occasionally, but I forget the character of them." I should add that the blood was examined for filaria, but with negative results.

Report by Dr. W. A. Verec on fluid drawn from Annie H——'s abdomen.

2 March, 1891.

THE fluid when received was of a chocolate colour, and had no distinct odour. On allowing it to stand for twenty-four hours, it separated into two distinct layers, the upper layer being white and opaque in bulk, but opalescent when spread on a glass; the lower layer, which constituted only about $\frac{1}{10}$ th of the bulk, was of a dark-red colour. Neither layer showed any tendency to spontaneous coagulation. On allowing the upper layer of fluid to stand for three or four days a white film collected on the top, which at first looked like a thick layer of cream on milk, but it was of a whiter colour, lesser density, and was not flaky.

The specific gravity of the white portion of the fluid was found to be 1,011, and of the lower dark portion 1,013.

The reaction was faintly alkaline.

Under the microscope the milky layer was found to contain granules in great number, like the so-called "molecular base" of chyle. Dense granules were especially numerous in the cream-like layer of the milky portion. There were also found numerous round granular cells like white corpuscles, only they presented no nuclei when subjected to the action of dilute acetic acid. There were also a few red cells.

The lower dark layer was found to consist almost entirely of distended and swollen red blood cells. When the specimen treated with dilute acetic acid dried it left beautiful arborescent crystals—really like the leaves of ferns, three or four being placed in a group, with their broken stalks end to end. (? Stearic acid.)

On heating some of the fluid in a test tube, a good quantity of coagulum formed, which, on the addition of dilute acetic acid, and saturated solution of common salt, became flaky, and was separated from the fluid by filtering. This showed the presence of serum albumin.

Alcohol was then added to the filtered fluid, and a white cloud formed at the junction of the two liquids. This showed the presence of either metalbumin or paralbumin. Some ferrocyanide of potassium was then added to a fresh portion of the filtered fluid, and no cloud formed, thus showing the former cloud to be due to metalbumin.

A current of carbonic acid gas was now passed through an aqueous solution of the milky fluid, and there came down a slight precipitate showing the presence of globulin. Some of the fluid was now completely saturated with magnesium sulphate, and there came down a fine precipitate, showing the presence of small quantities of paraglobulin.

Of sugar there was no evidence, on testing both before and after the removal of the albumen.

The fluid gave the delicate blue colour with the guaiacum and ozonic ether test, thus showing the presence of the fibrin of the blood.

With the cupric test for peptones, the fluid gave a reddish purple colour, showing the admixture of albumin and peptone. The presence of peptones was confirmed by Dr. Ralfe's test with Fehling's solution, with which it gave a violet colour.

On shaking some of the fluid with ether, and then evaporating, a fair quantity of oil was found. Under the microscope there were found, in the film left by evaporation, many oil globules of various sizes, and some peculiar crystals like those of stearine. Could get no cholesterine.

The fluid showed very little tendency to decompose. Four days after I received it, it commenced to have a distinctly sour odour, not unlike that of sour milk. After keeping a week the odour became rather foetid.

The peculiar pink colour said by some observers to be exhibited by this fluid on exposure to the air I did not obtain; though a very pretty pink colour was produced between the two layers of fluid on disturbing them, due, I think, entirely to the admixture of the red blood cells with the milky-coloured fluid.

REMARKS.

Referring to chylous ascites, Dr. Joseph Coats, of Glasgow, writes:—"Of a different nature is 'ascites adiposus,' which may be confused with chylous ascites, as in it also the fluid is milky. In this case the milkiness is from fatty degeneration of cells, either the endothelium in ordinary ascites, or the cells in cancer. There is always the distinction between the two conditions, that in chylous ascites the fat is free, while in ascites adiposus it is in cells." As, however, Dr. Coats does not mention upon what evidence these statements are based, and as in his references to the literature of the subject he includes a paper by M. Letulle, I presume that he is really giving the views of that writer, as expressed in the "Revue de Médecine." To quote an article by Professor Whitla, of Belfast, on the same subject, M. Letulle is strongly of opinion that cases of chyliform ascites are always due to peritonitis, either of the chronic tuberculous, cancerous, or neo-membranous character, and independent of any opening or connection with the lacteals,

and he (M. Letulle) accepts the views of M. Guenoau de Mussy, who thinks "that the purulent products of the inflammatory action are slowly transformed with the leucocytes into a granulo-fatty emulsion."

The examination of the ascitic fluid in my case clearly shows that the milkiness was due to admixture of chyle, if the distinction mentioned by Dr. Coats be trustworthy, although I presume M. Letulle would probably point to the previously-diagnosed peritonitis as bearing out his theory. Even were there no more actual inflammation of the peritoneum than is usually associated with perihepatitis, one might still expect to meet with a very thickened peritoneum, where there has been chronic serous ascites; indeed, on opening an abdomen, I have found an adventitious layer $\frac{1}{4}$ of an inch thick, binding all the viscera down to the spinal column; this is probably what is meant by the term neo-membranous peritonitis, though I should prefer to call it plastic peritoneal effusion; at all events, whilst in my patient there was no evidence of, or reason to suspect, tubercle or cancer, there was probably a considerable deposit of plastic lymph; and to my mind it is as easy to suppose that such plastic lymph had become organised into a fibrous band (as in Quinke's case), and had throttled some of the lacteals in their course to the receptaculum chyli leading to their varicosity and rupture, as to suppose that a fatty degeneration of the peritoneal endothelium could occur so vigorously and rapidly as to supply $10\frac{1}{2}$ pints of milky fluid in eight days.

Of course it is merely a matter of speculation as to what actually occurred in my case, but that M. Letulle's theory is not absolutely correct, Dr. Coats virtually admits, seeing that he describes two forms of chyloform effusion; moreover, the fact appears to have been overlooked that a case was reported by Dr. Cayley in 1866, in which an extravasation of chyle from rupture of the receptaculum caused a fatal acuto peritonitis; and if it be argued that this case of Dr. Cayley's represents an accidental and very different condition to the chronic effusion of milky fluid, the same objection cannot be raised to the admirably-reported case of Dr. Whitla, which, as the writer says, "answers these fanciful theories for all time to come"; he describes a perforation of the lower third of the thoracic duct, which was studded with miliary tubercles, and impervious in its middle third. Had there been obstruction of the thoracic duct higher up, one might have expected chylo-thorax as well, or, as in a case quoted by Curnow, one might have found chylo-thorax without chylous ascites from a leak of the lymphatic trunk in the thorax. I am not aware whether chylous ascites, like chyluria, has ever been found associated with the filaria sanguinis hominis, and I believe I am correct in stating that filarial disease has never yet been reported in South Australia. In another situation, in the tunica vaginalis, milky fluid has been found associated with a lymphatic angioma.

Ormerod, in 1866, reported a case of chylous ascites, and of opaque yellowish left pleural effusion found by *post-mortem* examination to be due to plugging of the left subclavian vein from adhesive phlebitis, and the consequent (?) formation of chyle tumours in the neck and abdomen from stagnation and inspissation of chyle. Winiwartor had a case supposed to be due to congenital occlusion of the thoracic duct with the formation of compound cystic tumours at the root of the mesentery. The infant was tapped on several occasions, and apparently it recovered.

It would seem, therefore, that while there is but little evidence to support M. Letulle's theory of fatty degeneration of the peritoneal lining being the

cause of the milky appearance of such ascitic fluid, there is considerable positive evidence in favour of a mechanical origin of chylous ascites. With a thoracic duct, which has been gradually compressed or obstructed by a plug, it has been found that the stagnant chyle is apt to become inspissated, so that the absorption of chyle from the intestines is prevented, owing to the impermeability of the lacteals. This condition, however, seems to be rarer than the sudden obstruction which is likely to cause varicosity and rupture. In cases which have recovered, such as Winiwarter's, and that recently reported by Nieuwondt, it is probable that some collateral circulation has been set up through the central tendon of the diaphragm and the lymphatics of the peritoneum generally, as well as the blood-vessels, also by means of the right lymphatic duct.

References :—(1) Cayley—*Trans. Path. Soc.* (1886), p. 163; (2) Curnow—*Lectures, "Lancet,"* vol. i (1879), p. 834; (3) Winiwarter—*London Med. Rec.* (1879), p. 111; (4) Ormerod—*Trans. Path. Soc.* (1867), p. 199; (5) Quincke—*D. Arch., F. Klin. Med.*, xxx (1882); (6) Letulle—*Rev. de Med.* (1884); (7) Whitla—"British Med. Jour.," May 20th, (1885); (8) Busey—Paper read before the New York Med. Assoc.; (9) Coats—*Manual of Pathology* (1889), 2nd. Ed.; (10) Nieuwondt and Rosenweig—*Brit. Med. Jour.* (1892), July 16th.

A new Swine Disease in Victoria resembling Human Diphtheria.

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IN September last intimation was received by the Board of Public Health of the outbreak of a very fatal disorder amongst swine in the Geelong district, and Mr. Cameron, M.R.C.V.S., who reported thereon to the Stock Department, having considered the disease to be of a diphtheritic nature, it was deemed to have such an important bearing upon the public health as to call for a special investigation, which the Board deputed me to make.

The disease in question attacked the under-mentioned piggeries only, and first appeared at each on the dates here given:—

- (1) 21st August, 1891—Drysdale, $13\frac{1}{2}$ miles south-east of Geelong, owned by Messrs. McGallop Brothers.
- (2) 24th August, 1891—Lovely Banks, 6 miles north-east of Geelong, owned by Messrs. Matthews Bros.
- (3) 27th August, 1891—North Shore, $4\frac{1}{2}$ miles east of Geelong, owned by Messrs. Bannerman and Jarman.
- (4) 28th August, 1891—Gheringhap, $9\frac{1}{2}$ miles north of Geelong, owned by Messrs. Bannerman and Jarman.

Of these piggeries, (1) and (2) have slaughter-yards attached, and (3) and (4) are in communication with the Geelong city abattoirs, from which offal is brought daily to feed the pigs. All of them have ample grass meadows, feeding-yards, in part paved and furnished with troughs, open sheds as night-shelters, and good water supplies, and, with the exception of Lovely Banks, which is flat and undrained, they have good natural drainage. At (2) and (4) separate styes are provided for special animals (sows about to litter, or suckling young broods, and breeding hogs), and these isolated animals enjoyed a striking immunity from the disease. No fresh pigs had been introduced from without at either of the piggeries for many months prior to the outbreak, with the exception that at North Shore the herd is kept up solely by drafting down batches of pigs of a year old from (4), the last batch, sixteen in number, having been brought down in waggons two or three weeks before the outbreak.

The history of the disease, as supplied by the herdsmen some three or four weeks after the outbreak, was substantially the same at each piggery. At Drysdale there were thirty-one healthy pigs (excluding sucking-pigs, to which the figures given in this paper do not refer, except when special mention is made of farrows). On Friday morning, 21st August, one of the pigs did not come to feed, and it was found to be frothing at the mouth, breathing noisily, apparently choking. In an hour or two it commenced to swell at the throat, and continued to get worse till it died seven hours after first seen ill. Another died with the same symptoms the same day, and the following two days twelve more died of the same affection. After this no more died, but the whole herd appeared to be affected, as shown by a disinclination to feed, though not all with the swollen neck and hard breathing.

The finest of the herd and sows "heavy in pig" were those which suffered most and which died. One sow gave birth to ten young while she was dying from the disease, and her litter was distributed amongst healthy sows that were suckling, and all the litter survived; but the litter of another sow which was seized with the disease and died while suckling them, after being similarly distributed, died in a day or two. These dead suckers were said to have "a pinched appearance, as if they died from inflammation." They were not opened for examination, but Mr. Gallop described the throat-swelling of one of the larger pigs, which he examined after death, as appearing, when cut into, "like a gelatinous matter in the meshes of a kind of spongy structure," and he attributed the death of the animal to suffocation from pressure of the swelling upon the windpipe. The duration of illness in the fatal cases here was from five to twenty-four hours, averaging ten hours. When recovery occurred the swelling and noisy breathing gradually diminished together, and in two or three days the animal took to its food again as well as ever. When seen, however, four weeks after the outbreak, many of the pigs exhibited weakness of the limbs. All the pigs at this piggery ran together in yards and paddocks; none were kept apart in styes. The mortality was over 45 per cent., fourteen dying of thirty-one adult pigs, and all in the first three days. At Lovely Banks there were 120 healthy pigs (besides eighty farrows, which did not suffer from the disease) when the disease broke out. On Monday, 24th August, a prime young boar was found breathing noisily, like loud snoring, and its neck was much swollen. The swelling increased, becoming of a "black-red colour," the pig frothing at the mouth, and rushing about wildly till exhausted, eventually dying of suffocation, "like a child with the croup." Towards night nine more commenced to ail with similar symptoms, all dying in from two and a half hours to eighteen or twenty hours. On Tuesday evening twelve more had died, and on Wednesday another dozen. Then the disease moderated (fourth day), so that up to Saturday only five more died, making a total of thirty-nine. Up to 3rd September two more died, and on that day three others, with urgent symptoms, were killed for examination by Mr. Cameron. Most of the animals frothed at the mouth while ill—at first a white froth, but some time before death tinged with blood. "One pig lost the use of its limbs while ill; its skin all showed blue, and it had the easiest death of all." Another pig that was on the mend was paralysed in the hind limbs, dragging them after her upon the ground. Almost all the pigs in the yard were affected more or less, but those that recovered had but little swelling of the neck and not the loud snoring. One sow with suckers died, and after her death the litter was distributed amongst other sows. Within a few days of her death there died a number of suckers, equal in number to the dead sow's litter, but it was not certain, though it was assumed, that they were the brood of the dead sow. Of the 120 pigs here ninety ran free in the yards and paddocks, and thirty were kept apart in styes. Of the former, forty-three died, or 48 per cent., and of the latter only three were affected (one of which had been brought in from the yards only four days previously, and the other two only seven and fourteen days previously), and only one died (the latest arrival from the yards), giving a mortality percentage of $3\frac{1}{3}$ per cent. Of all these deaths thirty-four occurred within the first three days. North Shore piggery contained forty-three healthy pigs (all over ten months old) when the outbreak occurred there—24th August. Three animals were affected on the first day, and died the next morning, and in the three succeeding days eleven others died—total deaths, fourteen. About an equal number were also ill with like symptoms, but recovered. All of them were "off their food," and were

greatly swollen about the neck, their breathing being like a continual loud snoring. The duration of illness in fatal cases was twelve to twenty-four or thirty hours. All the pigs here ran together in the paddock, and 33 per cent. died, all within the first four days.

At Gheringhap were 170 to 180 pigs, all in perfect health till this disease broke out on 28th August. The first to suffer was a fine sow heavy with young. She was breathing hard, as though choking with a bone in her throat, had a swollen neck, and would not feed. She died quietly in three hours. Three or four more were affected by noon the same day, and ten altogether during the day. The disease raged during the next two days, and then quickly subsided, the last deaths occurring on 3rd September, when two or three died, and two were killed for *post mortem* by Mr. Cameron. In all about seventy pigs died, the great majority in the first three days. Some had hard deaths, dying of suffocation, and others went off easily, as if overcome by the intensity of the disorder. Most of the deaths were among the largest and oldest of the herd. Many others of the herd were affected and recovered, the swelling subsiding in the neck, the breathing then getting easier, and the animal in a few days again feeding as usual. The duration of illness in the fatal cases was from two to twenty-four hours. Among the general herd the mortality was about 40 per cent. Three special breeding hogs which were kept apart in separate styes, and were fed differently to the rest, entirely escaped the disease.

Of the surviving pigs at the four piggeries, when seen three to four weeks subsequently to the outbreak, the majority appeared in good health. A good many, however, were lame in various forms and degrees, the legs appearing to give way under some from want of power; others tripped and fell as they walked. At North Shore were two animals with a very peculiar gait. They seemed unable to progress more than twenty yards or so without sinking down on the ground to regain strength, and in walking the hinder feet were, at each step, raised to an undue height, and planted down again with rapid, jerky movements, which called to mind the ataxic gait of man. At Lovely Banks a young gelding of about 11 months was unsteady on its hinder limbs, which, in walking or standing, were widely straddled apart, as though to give steadiness. The latter animal presented a considerable submaxillary swelling, as did also several others among the herds. It and a few others breathed somewhat rapidly, and with a tubular or whistling noise, especially after a short run. White froth was constantly dropping from its mouth, and its rectal temperature proved to be 105.3 degrees F. (the pig normal about 102 degrees). It was killed for examination, and the following are notes of the *post mortem* :—

Submaxillary lymphatic glands (five) greatly enlarged and indurated.

Soft palate—Two large puckered cicatrices, $\frac{3}{4}$ in. x $\frac{1}{4}$ in., one on each side of median line.

Larger bronchi—Filled with light blood-tinged froth.

Smaller bronchi—Mucous lining membrane velvety, and of a dark-red colour.

Lungs—Greater portion of both mottled with dark-red pneumonic patches—friable, crepitation imperfect, floating in water (the alveoli generally containing a fibrillar mesh, supporting epithelial and blood cells).

Heart—Large *post-mortem* clots in R. cavities.

Kidneys—Capsules readily stripped off, surface pale, but faintly mottled with dark-red patches, and dotted with minute pale-yellow dots, like pin-heads. The pyramids were bright red, markedly striated, and on scraping yielded epithelial tube-casts and some fat globules.

Urine taken from the bladder was pale in colour, and on testing with heat, and HNO_3 cold, gave a decided cloud of albumen.

Great omentum contained a cyst, size of a hazel-nut, enclosing the cystic scolex of a tænioid worm.

Mr. Cameron, M.R.C.V.S., made several *post mortems* shortly after the outbreak, and discovered:—Ulcers, involving the entire thickness of the mucous membrane on soft palate, rudimentary tonsils, pharynx and larynx, varying in extent from the size of a pea to a square inch or more; also, in similar situations and of like extent, patches of tough, dirty-grey, false membrane, pretty firmly adherent to the submucosa. One such patch was surrounded by a zone of bright-red injection, over an inch broad, but in the others the false membranes were abruptly bounded by healthy mucous membrane. In cervical cellular tissue, inflammatory exudation and numerous enlarged lymphatic glands, many of which were the sites of abscesses. In middle mediastina of two animals were effusions of blood, the larger amounting to from 2 to 3 ounces.

Between the four affected piggeries there existed no intercommunication, except that, as above mentioned, batches of pigs were occasionally sent down to North Shore from Gheringhap. None of the attendants at or visitors to the piggeries were known to be suffering from any illness, or in communication with sick persons. Of a number of other animals on the several premises none appeared to be in ill-health except two cats at Lovely Banks, which fed upon raw offal *ad lib.* These had large weeping sores on their backs, while a third cat at the same place, which was carefully fed on boiled offal only, was in perfect health.

Those pigs which were kept in styces were not only isolated from the general herds, but were fed differently.

The following table compares the food and rates of mortality, &c., at the several piggeries:—

Piggery.	Original number of pigs.	Number of deaths, and percentage.	Food.
(1) Drysdale	31, all at large in yards and meadows.	14, = over 45 per cent.	Grass, mangolds, boiled offal, a little blood, and occasionally raw offal from the abattoir attached.
(2) Lovely Banks.....	90, at large	43, = nearly 48 per cent.	Grass, mangolds, and peas, boiled offal, blood and raw offal from attached abattoir.
	30, in styces	* 1, = over 3 per cent.	Pollard and peas, soup, and boiled offal.
(3) North Shore...	43, at large	14, = nearly 33 per cent.	Grass, blood, and raw offal, from Corporation abattoir.
(4) Gheringhap	171, at large.....	70, = 40 per cent.	Grass, boiled offal, and soup: occasionally raw sheeps' paunches from Corporation abattoir.
	3, in styces.....	0, = 0 per cent. ...	Pollard, soup, and boiled offal.

* This animal had only been brought in from the yards four days previously.

One may infer from this table that the disease came through the medium of raw offal, used for feeding the pigs, no deaths occurring amongst those pigs which did not partake of raw offal. Two other pigs, in addition to the above fatal case, among the thirty styre pigs at Lovely Banks, were affected, but their styres were in proximity to the fatal case, and, moreover, they, too, had been feeding on raw offal with the general herd seven and fourteen days beforehand respectively.

Raw offal was largely used for feeding the pigs at another large piggery in the district, viz., at Lara, but the disease did not appear there. On inquiry into the origin of the slaughtered animals from which the offal was derived, it was found that the only offal common to the affected piggeries, and not to the Lara piggery, was derived from a certain class of sheep. These sheep were trucked down to Geelong from the Riverina district, and then travelled over a few miles of public road to the paddock, from which they were distributed to the several abattoirs; no infectious disease was known to exist along the latter portion of this route. Concerning these sheep it had been remarked by a slaughterman at Drysdale that "some were a bit wasted, but they were mostly in fair condition"; the wasting he attributed to the two days' railway journey.

Experiments made by Dr. James Law, of Ithaca, New York, when investigating "Hog Cholera," in 1878, show that the blood of a pig suffering from the disease at its height, when injected into sheep, produced "constitutional disturbance so slight as to be easily overlooked, the appetite and rumination scarcely suffering for a day," yet the blood of the same sheep, then inoculated upon healthy pigs, induced the disease in the latter in all its intensity. It seems likely that the sheep above mentioned were suffering from some similarly mild affection, such as might pass unnoticed, and were the medium by which it was conveyed to the pigs to develop its full severity.

Human diphtheria had been on the increase in Geelong since the beginning of the year, but was especially prevalent during the month which preceded this outbreak amongst the swine, as the following table shows:—

CASES of Diphtheria, Croup, and Diphtheritic Croup notified in Geelong District.

	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	To 11th Sept. 1891.
Diphtheria { Cases ..	2	7	7	16	13	13	51	16	6
Deaths ..	...	2	1	...	2	2	4	1	.....
Croup and Diphtheritic { Cases ..	...	...	1	...	2	3	2	1	.....
Croup { Deaths ..	...	...	1	...	2	2	1	...	.....

The Geelong swine disease, so Mr. Cameron, M.R.C.V.S., informed me, was a disease unknown to veterinary surgeons in Victoria, and not described in British works on veterinary medicine. It bore a strong resemblance to human diphtheria, and it is unfortunate that the opportunity for making bacteriological tests was lost. Future experience will perhaps decide whether it was the same disease.

Remarks on 750 Cases of Skin Disease.

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THE following notes are taken from cases which have presented themselves recently at the Melbourne and Alfred Hospitals, and in my own private practice.

I am aware that 750 cases is a somewhat limited number from which to draw trustworthy data, but I trust they may be of some interest, inasmuch as they were taken with careful enumeration of details concerning the frequency of occurrence of the different skin affections, their duration and type, the age, sex, and general health, &c., of the patients attacked. It is with the object of comparing these points with those given in statistics taken from other parts of the world that I have been induced to bring this subject before the Congress.

The following is a statement of the numerical ratio in which the different diseases of the skin presented themselves:—Eczema, 287; Psoriasis, 52; Herpes, 18; Urticaria, 10; Pemphigus, 6; Impetigo contagiosa, 31; Lichen Ruber Planus, 1; Cheiro-pompholyx, 2; Erythema multiforme, 5; Dermatitis herpetiformis, 4; Lichen circumscriptus, 2; Furunculosis, 10; Carbuncle, 3; Dermatitis, 5; Purpura, 2; Keratosis pilaris, 2; Verruca, 1; Lentigo, 2; Ichthyosis, 2; Scleroderma, 1; Naevus pilosus, 2; Chloasma, 2; Lupus vulgaris, 4; Lupus erythematosus, 3; Syphilis, 184; Leprosy, 1; Telangiectasis, 4; Lymphangioma circumscriptum, 1; Rodent ulcer, 3; Pruritus, 5; Hyperidrosis, 1; Bromidrosis, 1; Seborrhœa, 11; Sebaceous cyst, 1; Comedones, 2; Acne vulgaris, 15; Acne rosacea, 6; Hirsutes, 2; Alopecia areata, 5; Sycosis, 5; Onychia, 2; Tinea trichophyton, 7; Tinea versicolor, 7; Scabies, 13; Pediculosis, 17.

ECZEMA.

Frequency.—In Melbourne, as in all other cities where statistics on the subject have been collected, eczema stands numerically first. Here it forms about 38 per cent. of all cases. This is about the proportion in which it occurs in America, according to White and Duhring—Bulkley of New York gives about 33 per cent., M'Call Anderson gives 25 per cent. for Glasgow, and Hebra gives but 8 per cent. for Vienna.

Considering that there are very few children at my clinics the percentage given is certainly high; for eczema is very prevalent in the first decade.

Age.—In 200 cases of eczema analysed, the greatest numbers presented themselves between the ages of 20 and 30 and between 50 and 60, and the fewest between 70 and 80.

Heredity.—As to hereditary transmission, in only 7 per cent. of cases was it possible to trace any history of skin disease in the parents.

Sex.—I find that there are about equal proportions of males and females attacked. These statistics correspond with those of many other authors, notably Bulkley of New York, who gives 1,288 males and 1,212 females out of 2,500 cases, M'Call Anderson of Glasgow gives 296 males and 204 females

out of 500 cases. Hebra's proportions, however, are two males to one female. This difference is ascribed by Crocker and Bulkley to the publicity of the clinic, hence the greater reluctance of women to attend.

Duration.—As to duration, 47 per cent. of the cases have existed on and off for more than twelve months, the longest recorded being twenty-three years. Twenty-one per cent. had lasted for less than a month without previous attacks.

Variety.—The variety, or more correctly speaking the phase, in which the majority of cases were met was the vesicular form, or rather were cases in which vesiculation was the most prominent feature; next in order were the papular or squamous forms, then the pustular, the least frequently met form being the erythematous.

In a large number of cases the type described by Dr. Unna, of Hamburg, as (*vide* "Year Book of Treatment," 1889, p. 277) Seborrhœic Eczema was met with.

PSORIASIS.

Frequency.—Fifty-two cases of psoriasis are recorded, giving an average of about 7 per cent; this is much higher than the Vienna records. Hebra gives 1 in 60 as the average. The figures, however, correspond very closely with statistics in England and Scotland. M'Call Anderson reports 725 cases in 10,000. In America, the statistics of Dr. White give 152 in 5,000, and those of the American Dermatological Association give 533 cases in 16,863, or in each case about 3 per cent. It will thus be seen, so far as my statistics go, that the disease occurs in Melbourne with about the same frequency as it does in London and Glasgow, but is much more common than in Vienna and American cities.

HERPES.

Frequency.—Of the three forms of Herpes, H. Facialis, H. Praeputialis, and H. Zoster, the two former have come under my notice but once in each form, whilst of the latter there are 16 cases recorded, a little over 2 per cent. of all cases. This makes the disease appear more common than in England, where the average is stated by Crocker to be about 1·3.

URTICARIA.

Frequency.—Ten cases of urticaria are recorded, which gives over 1 per cent. This is in fact considerably short of the percentage of cases that really occur, for owing to the ephemeral character of the lesions the disease in many cases disappears before medical aid is sought. It is as a rule only the chronic or persisting varieties that come under notice. In these, although the individual attacks are acute, yet they occur with much frequency, the whole disease being spread over so long a space of time as to merit the name of chronic.

PEMPHIGUS.

Frequency.—Six cases are recorded; this makes the percentage high as compared with the statistics of other countries. In America, fourteen cases are recorded in 16,863 cases, and fifteen in 5,000, according to the statistics of the American Dermatological Association and those of Dr. White of Boston, respectively.

M'Call Anderson gives twelve in 10,000, and Professor Kaposi of Vienna one in 300.

Type.—The type seems to differ in no way from that seen in other countries.

IMPETIGO CONTAGIOSA.

Thirty-one cases are recorded. It occurred in nearly every case in children. It differs in no way from cases which occur elsewhere.

I have looked in vain for the form of Impetigo described by Duhring. Dr. Colcote Fox and other Dermatologists in England have told me that they too have been unable to identify it with any disease in their clinics.

LICHEN RUBER PLANUS.

This form of Lichen, which I consider to be the only legitimate representative of the once formidable Lichen group (*vide* paper "The Lichen Group," by the author, *Australian Medical Journal*, June, 1890), is a rare disease in England and Europe, but from my limited experience it seems to be much more so in Australia, for I have seen but one case of the disease here. The case referred to was exceptionally well marked, and will be reported elsewhere.

CHEIRO POMPHOLYX.

Frequency.—Two cases of this disease are recorded in my notes. The type was well represented in one of the cases, a lad of 17. He was attacked in a similar way twelve months previously. The eruptions commenced as small vesicles, without any inflammatory symptoms, on the inner aspects of the fingers. These looked like boiled sago-grains beneath the skin; they gradually became confluent, and formed bullae, which finally ruptured, this practically terminating the attack. The feet were also involved.

ERYTHEMA MULTIFORME.

Frequency.—I have notes of five cases; three were cases of ordinary erythema multiforme conforming to the papular and tubercular types. The remaining two cases correspond with erythema iris (herpes iris), and they are placed here rather than in the herpetic group, as I consider the disease to be an advanced phase of erythema multiforme.

Erythema multiforme is a rare disease, but as I cannot find any reliable statistics on the subject, I am unable to say whether it is more common here than it is in England and Europe, but I am inclined, from my own observation in the London clinics, to think that it appears here in about the same ratio as there.

DERMATITIS HERPETIFORMIS.

Dermatitis herpetiformis (including herpes gestationis). Four cases coming within this category have been observed, two of them corresponding with herpes gestationis. One of the cases, a most typical example, is reported in another communication to the Congress.

LICHEN CIRCUMSCRIPTUS—FURUNCULOSIS—CARBUNCLE—DERMATITIS.

Two cases of lichen circumscriptus (which I consider to be closely allied to seborrhœic eczema), ten cases of furunculosis, three of carbuncle, and five of dermatitis complete the list of diseases included in the inflammatory group. As to the case of dermatitis, in two the lesions were on the feet, produced by the irritating dye of coloured stockings; in one the dermatitis was in the exposed parts due to their contact with the fumes of arsenic

and caustic soda ; in another the hands alone were affected from constantly handling nitro-glycerine. The last and fifth case was produced by a species of scrub commonly known as dogwood.*

PURPURA.

Two cases only are recorded ; one was interesting, in which the site of the lesions on one side became gangrenous.

KERATOSIS PILARIS—VERRUCA—LENTIGO.

These are common enough affections, but as they frequently pass unheeded, they do not come under the notice of the Dermatologist with anything like the proportionate frequency that other affections do, hence the numbers given do not indicate even approximately the ratio in which they really exist.

ICHTHYOSIS—SCLERODERMA—NÆVUS PILOSUS—CHLOASMA.

Two cases of ichthyosis, both in children, and one of circumscribed scleroderma (morphœa) have been met with ; the latter occurring in a child 5 years old, consisting of a patch about $2\frac{1}{4}$ in. long by 1 in. broad, situated on the left side of the chin, and dating from an attack of mumps six months previously.

Of the two cases of nævus pilosus, one a girl of 18 years, the whole of the left leg from the toes to the knee-joint was enveloped in a nævoid growth, consisting of hypertrophied and pigmented tissue, thickly covered with a growth of coarse black hair an inch and a half in length.

Chloasma occurred twice—once in a woman, with uterine trouble ; and once in a child, affecting the nose without any assignable cause.

LUPUS VULGARIS.

The proportion of cases of lupus vulgaris differs very markedly in different countries. In England it is a moderately common affection, occurring in about 2 per cent. of all cases of skin disease. In Scotland, according to M'Call Anderson, 198 cases occurred in 10,000. In France and Germany it is more common still, but in America it is rare, occurring in about the proportion of 1 in 400. My own figures give 4 cases in 750. Thus, if one can judge from this limited number, it would appear to be more common than in America, but rarer than in England, France, or Germany. In two of the cases the disease occurred in patients beyond the age at which it usually commences ; one was 30 and the other 50 years old. In these patients it spread very slowly, and had never ulcerated. In the other two cases the disease had commenced in childhood, and had run quite a typical course. In connection with one of these cases, however, it must be noted that the disease originated in England before the patient came to the Colonies.

LUPUS ERYTHEMATOSUS.

Frequency.—This affection occurs in America in about the same ratio as lupus vulgaris. In England about one case of the former occurs to four of the latter. Three cases are recorded in my notes, which makes its ratio nearly equal to that of lupus vulgaris.

* A condition allied to, if not identical with, the above is described by American authors (*vide* article by J. C. White, New York Medical Journal, March, 1873), due to contact with a species of plant, *Rhus venenata*, also known as dog-wood, or poisonous sumach. I have not yet been able to ascertain whether the two plants are identical.

One case was associated with a marked tendency to chilblain formation, an association frequently remarked by other observers.

In the second case, in which the characters of the disease were especially well marked, the patient had always been subject to flushing on the slightest provocation. Before the lupus erythematosus had definitely developed the patient suffered very much with gastric disturbances, which were diagnosed as dependent on pyloric obstruction, for the relief of which Loreta's operation was performed by Mr. O'Hara; the flushings and gastric symptoms all disappeared, but the former soon returned, and finally terminated in pronounced lupus erythematosus.

LYMPHANGIOMA CIRCUMSCRIPTUM.

One case of this rare affection is recorded; it occurred in a girl 12 years of age, and affected the upper part of the right thigh.

SYPHILIS.

One hundred and eighty-four cases of syphilis of the skin are recorded, this included secondary as well as tertiary manifestations. Four interesting cases of accidental inoculation have occurred, the lip, back of hand, nipple, and soft palate being respectively the seat of the chancre.

In one case a private patient was very confident of his dates; the incubation period was longer than in any case I can find recorded in the literature of syphilis, from the time of exposure to contagion to the time of the first appearance of the chancre being ninety-eight days. Of the secondary and tertiary syphilitic manifestations of the skin, 86 per cent. of the cases presented themselves with the former and 14 per cent. with the latter. The following table gives the percentage and the form of eruption with which the patients were affected when presenting themselves:—

32	per cent.	presented themselves with	macular syphilide.
19	"	"	papular.
29	"	"	papulo squamous.
6	"	"	pustular.
14	"	"	tertiary ulceration.

These figures are not meant to imply that syphilitic rashes appear in this ratio, for some of them pass over unheeded by the patient. Thus the macular syphilide probably occurs in over 80 per cent. of cases, but has frequently passed off before the patient seeks advice.

The mucous membranes were affected in 60 per cent. of all cases examined in the secondary period; of these the fauces were affected in two-thirds of the cases.

Fourteen per cent. of cases presented themselves with syphilitic ulceration of the skin, due to cutaneous or sub-cutaneous gummata in patients who had either had no treatment at all, or in whom the treatment had been inefficiently carried out.

So far as I am able to judge, the course of syphilis here, so far as its cutaneous manifestations are concerned, is, as yet, unmodified by climate and surroundings, and it differs in no way from that seen in European countries.

LEPROSY.

From the close proximity of the Australian Colonies to countries where leprosy is of common occurrence, and from the comparative free admixture of the inhabitants of these countries with Europeans, one would be inclined to infer that leprosy would exist in greater proportion than it does.

Frequency in Victoria.—I have seen but one case in Melbourne, and this a European who had lived in Australia for six years, and had not been brought into contact with lepers for eight years. (The full notes of this case are reported in the *Australian Medical Journal*, December, 1891.)

Three other cases, all Chinese, are segregated at the Middle Quarantine Station.

Since 1884 the total number admitted to the quarantine station is seven Chinese and one European; three Chinese have since died, leaving a European and three Chinese; this makes up the total number of lepers at present known in Victoria.

DISEASES OF THE APPENDAGES.

The remarks made with regard to some of the diseases under the heading of hypertrophies apply with still greater force to the majority of diseases of the appendages. Many of them are trifling affections and do not come under the notice of the Dermatologist. The proportion to other diseases is much greater in private than in public practice. Acne vulgaris is a very common affection, probably ranking next in numerical order to eczema, yet but about 1 per cent. of all cases is about the ratio in which I have seen it at my hospital clinics. In private practice it formed 8 per cent. of all cases.

One case of hyperidrosis of the hands and feet is worthy of notice on account of its severity. It occurred in a young girl of 16. (Her mother's hands were affected in the same way.) The intensity of the condition varied, but when at its worst the sweat dripped from the finger-ends as if the hands had been immersed in water. It had existed from infancy, but had become gradually worse. Although only eleven cases of uncomplicated seborrhœa are recorded, yet the seborrhœic process is a very frequent pathological concomitant in many cases of eczema, syphilis, &c.

PARASITIC AFFECTIONS.

I have been struck by the comparative rarity of the vegetable parasites (excepting *tinea versicolor*) at my clinics. Reference to the tabulated records will show that there have been no cases of *tinea favosa*, but five of *tinea tonsurans*, one of *tinea barbae*, and one of *tinea circinata*. These figures give a little under 1 per cent. of all cases, and contrast in a marked degree with those of other countries. M'Call Anderson (Glasgow) gives four cases of *tinea favosa* and thirty-six of *tinea trichophyton* in 1,000 private cases, or nearly 4 per cent.; and 156 of *tinea favosa* and 142 of *tinea trichophyton* in 10,000 cases, or 3 per cent. of all cases. Crocker considers *tinea tonsurans* to be one of the most common skin diseases in England, forming 8 per cent. of all cases, or, including all varieties of *tinea trichophyton*, forming 10 per cent. In America it forms between 4 and 5 per cent. It will then be seen, so far as my statistics are concerned, in comparison with other countries, the proportion of these affections is very low. I confess to having anticipated finding these diseases very prevalent, owing to the warmth of the climate; however, it seems that this is more than counterbalanced by the generally clean habits of the people, where the practice of taking frequent baths is common even amongst the lower classes.

TINEA VERSICOLOR.

This affection, due to the invasion and growth of the microsporon furfur occurred in about 1 per cent. of cases. This more nearly accords with the statistics of other countries than is the case with any of the other vegetable parasites.

ANIMAL PARASITES.

As to the animal parasitic diseases scabies and phthieriasis the contrast is still greater, especially with regard to scabies—thirteen cases only are recorded, which gives under 2 per cent. of all cases, whereas M'Call Anderson records 2,527 cases in 10,000, or over 25 per cent. Crocker gives 11 per cent. in hospital practice, and 3 per cent. in private. In Europe it is a very common affection, but in America it forms but 1 per cent. in some cities, and 2 per cent. in others.

In conclusion, I would say that I find no diseases of the skin which are peculiar to this part of Australia; and with regard to the forms that are met with here, all of them are seen in English, European, and American clinics, although the frequency of their occurrence varies, yet I am at present unable to detect any essential difference in type owing to climatic or other surrounding influences.

A Case of Dermatitis Herpetiformis

A. W. FINCH NOYES, JUN., F.R.C.S., Edin.

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IN the July number (1889) *Australian Medical Journal*, I recorded two cases of dermatitis herpetiformis, and at the same time gave a short historical sketch of the affection and of the various attempts at classification and definition of the disease by different authors. I do not, therefore, intend to repeat the history as it was then given, but would refer members of the Congress to the article above alluded to; nor do I intend to give a detailed account of the various symptoms met with, for many writers have recently done so (*vide* Brocq, "De la Dermatite Herpétiforme de Duhring," *Unna, "Monatshefte für praktische Dermatologie,"* August 1st, 1889; and Jamieson, "Dermatitis Herpetiformis, Edin.: *Medical Journal*, 1891"). Suffice it to say that nearly all are practically agreed regarding the four cardinal symptoms, which are:—

1. *The polymorphism of the eruption.*—This symptom, which exists in nearly every case, need not necessarily be marked in any given attack, for one type may exist alone throughout that attack. However, the rule is for polymorphism to exist, and the usual course of the eruption is first the development of erythematous lesions, with the subsequent evolution of vesicles, bullæ, or pustules upon them or in their immediate vicinity. A leading feature also is the mode of distribution of the lesions. They have a great tendency to group after the fashion of herpetic lesions, or to form circinate figures.
2. *The long duration.*—The disease is kept up by repeated relapses, with or without intervals of freedom from the eruption.
3. *Pruritus.*—This is a marked feature of the disease, and is at times almost intolerable. Its intensity, however, varies in different attacks.
4. *The state of the general health.*—It is seldom that patients exhibit any constitutional symptoms, in spite of the extensive surface of the body involved in the eruption, and in spite of the severe pruritus.

The following are the notes of the case I wish to record (other cases have been observed by me, but as none of them were typical examples of the disease, I prefer to leave them unrecorded until I have had the opportunity of watching their further developments):—

A.T., a well-developed muscular man, 30 years of age, a cabinet-maker by trade; he has never, excepting for the present eruption, suffered from any illnesses but the simple ailments of childhood.

Family History.

Father alive, and is a healthy man, but for pruritus of the skin, from which he has suffered since 26 years of age. Patient states that one of his sisters was subject to some form of skin eruption, but he is unable to describe it.

Past History of Present Disease.

The skin eruption first showed itself eighteen months ago. It began as raised reddish patches and papules upon different parts of the body. They were intensely itchy, and subsequently became the site of "water-blisters." The eruption first appeared on the shoulders and back, then on the arms, head, and chest, and finally on the legs; the soles, palms, and front of the abdomen have never been affected. Since first attacked, patient has never been free from the eruption, although it has subsided to a great extent at times, but only to break out afresh with renewed energy.

Present Condition.

At present both arms, shoulders, legs, buttocks, and back are covered with an eruption which is essentially polymorphic in character, consisting of erythematous patches, papules, vesicles, and bullæ; on the shoulders the lesions are chiefly erythematous, on the arms erythematous-vesicular and erythematous-bullous, and on the legs erythematous-vesicular. The erythematous lesions vary in size from a small split pea to that of half-a-crown. They are usually round in shape, and raised considerably above the level of the surrounding skin. In colour they vary from a purplish to a dusky red. They closely resemble, both in colour and contour, the papular and tubercular forms of erythema multiforme. The vesicles, which form on these erythematous bases, are about the size of sago grains, and in a great many places bear a very close resemblance, not only in size, but also in their arrangement, to the lesions of herpes. They are arranged, for the most part, in small groups or circles, up to an inch in diameter. However, there appear in some places segments of broken arches, with a much larger diameter. The bullæ, a few of which are at present scattered over the surface, are about the size of the finger nail; but, according to the statement of the patient, they have varied from the size of a split pea to that of a five-shilling piece. The course of the different lesions varies. Sometimes they clear up very rapidly, and are followed by fresh outcrops, or more frequently individual lesions persist for a lengthy period. The vesicles do not tend to undergo spontaneous rupture, but the contents become partially absorbed, and then replaced by a dry crust. In some places a certain amount of superficial scarring and pigmentation is left after disappearance of the lesion. The patient complains bitterly of the pruritus, which at times is almost intolerable. It varies, however, in intensity in the different attacks, and he has obtained much relief from treatment:

General Health.

The bowels are regular, the urine normal, and the appetite is good—in fact, the patient is in excellent general health.

Reclamation of the Nail-bed.

HERMAN LAWRENCE, L.R.C.S., Edin. ; M.R.C.P., Edin., &c.

HAVING paid some attention to affections of the nails and nail-beds, I have observed where a nail has been injured or removed—as, for example, in the operation for in-growing toe-nails—that when the nail has subsequently been restored by nature, the nail-bed, if previously to the injury it was imperfect, generally remains so, and the connections and appearances of the new nail, accordingly, are more or less modified. Should the connection between the nail and the subjacent corium have become destroyed, as sometimes happens underneath the free end of the nail, the portion of corium so separated from the nail ceases to constitute a part of the nail-bed, or, in other words, to contribute its quota towards the formation of nail at that point, and instead becomes covered with epidermis, a hiatus in the connection between nail and corium at this point resulting. In such a case where the process of repair has brought the new nail as far forward as such a spot, the epidermis continues to be epidermis pure and simple, being unable to connect itself with and assist in the formation of the advancing nail, and the nail grows over the gap without effecting a connection with the corium there, and the spot where the nail-bed is in this way deficient becomes an unsightly opaque white dip in the attached outline of the opaque free end of the nail. The deformity, so far from ceasing to be present when the new nail has completed its growth, is likely even to be aggravated owing to further separation of nail from nail-bed, through the movements to which the finger or toe-end may have been subjected. When a nail-bed has become deficient in this kind of way, and not from any constitutional disorder, I have in several cases succeeded by the following procedure in reclaiming it. In one of the cases with which I had to do the amount of natural nail-bed existing was only about one-tenth of an inch ; after operation the extent of nail-bed was not less than one-half inch. The result might have been perfect had not the patient failed to maintain the necessary quietude of the anterior portion of the finger during the later part of the operation. A splint is prepared which can be comfortably attached so as to support and rest the finger. The end of this splint, which should support the anterior or pulpy portion of the finger, must be made so as to have a slight anterior inclination sufficiently to raise that part slightly, so as to ensure close contact between the nail as it arrives and the tissue beneath it, but care must be taken that the pressure of the splint is not such as to cause any blanching of the surface of the finger-end, which would indicate a hindrance to the cutaneous circulation, otherwise a bad result will follow.

In the case in which there was only one-tenth of an inch of the nail-bed left I removed the nail entirely, and as this returned with a new formation of nail-bed, keeping the precautions just mentioned in mind, I prepared for the obstacle, which would prevent the nail-bed passing its previous limiting border, by softening the scarf-skin which had usurped the position with boracic bread poultices, and then removing it with a piece of pumice-stone

suitably shaped. This part of the operation, namely the removal of the offending scarf-skin, may be carried out by the use of Unna's salicylic and ereasote plaister mull, and by scraping, or curetting, &c.; but great care must be taken not to interfere with the onward progress of the anterior border of the nail-bed formation, and so blistering fluids must not be used. They have proved failures in my own hands when used for this purpose. As the formation of the nail-bed nears its natural anterior limiting border (which is situated in a curve commencing laterally at those points of the finger from which the definite tapering begins), then the greater attention must be given to the sufficient adaptation of the splint, so as to prevent any movement whatever of the tip of the finger.

Treatment of Hirsuties by Electrolysis.

HERMAN LAWRENCE, M.R.C.P. Edin., &c.

THE treatment of hirsuties by electrolysis is so tedious that most surgeons who have practised it have given it up in despair. You need only, I think, glance at the descriptions of this proceeding as given in most text-books to fully appreciate its utter tedium and hopeless irksomeness. After my first cases I, too, was tempted to relinquish so unreasonable a task—a task in which my own patience and that of the patients were so terribly taxed; but, by adopting the following amendments, if I may be allowed the expression, I am now enabled to remove hair from undesirable locations—to remove them permanently, that is to say, not temporarily—in a manner satisfactory both to the patient and to myself.

My first amendment is the use of cocaine. This does away with the pain, often very severe, although I may remark that in books it is generally referred to as slight, or ignored altogether; but before I used cocaine I had the greatest bother in the world to induce patients to submit to the many operations that are often required to rid them of their unnecessary hair. In my later cases I have found one or, at the most, two injections of cocaine suffice for the whole series of operations; the first general operations helping to deaden the nerve filaments, at all events sufficiently to enable the patient to undergo several future operations without a repetition. In cases of trichiasis I dissolve a granule or two of cocaine in the blood exuding from a hair follicle which has been pricked with the needle before proceeding to electrolytic measures. In this way I avoid using the hypodermic needle in an especially sensitive part.

My second improvement is one which brings about an economy of time. It consists in allowing the current to be constantly acting while manipulating with the needle. The plan hitherto adopted has been to break the current before introducing the needle into the follicle, as also before withdrawing it from that situation. The use of cocaine enables me to adopt this, my so-called improvement, without unnecessarily shocking the feelings of the patient. But this constant, instead of interrupted, use of the current has a further advantage. It does away with the pustules which appear round the follicles after the needle has been introduced, even with all due care, and as a consequence with the scars that may result from the pustules. I attribute this to the fact that the elasticity of the *meatus folliculorum* is destroyed by the influence of the current, and so a freer exit is afforded the débris both during and after operation.

Lastly, I have found that many hairs may be safely epilated without electrolysis if the following plan be adopted:—When five or six hairs are close together, the one or two in the centre may be simply epilated, for it appears that the destruction of the papillæ of the hairs surrounding them causes also the destruction of their own papillæ.

A Pathological Specimen of a Rare Skin Disease.

DR. LAWRENCE also exhibited a remarkable specimen of ichthyosis sauradina, removed *post mortem* from the leg, “the same condition existing from almost the soles of the feet below to near the upper third of the leg above.”

Movable Kidney.

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THIS condition is frequently overlooked in women because gynæcological or obstetrical reasons can generally be found for most of their ailments. A degree of dexterity in manipulation is necessary to establish proof that a movable kidney is present. My attention was lately drawn to this subject, and, believing that it has not received adequate consideration in general practice, I briefly record my experience in order to elicit that of others.

Omitting the interesting questions as to the anatomical situations—the differential diagnoses and methods of examinations—of movable kidney, I pass at once to its

FREQUENCY OF OCCURRENCE.

Becquet states that he found it in one out of every 250 cases examined; Roberts reports 70 cases; David Drummond 31; Bartels, Nousseau, Newman, Loudon, and Ebstein have thoroughly studied the condition.

During the past twelve months I have carefully examined 135 hospital patients for this purpose, and found twelve distinct cases (8·8 per cent.); only one patient had both kidneys movable, and each of these patients consulted me for symptoms which they attributed to other organs, while 25 per cent. of the number had been actually under treatment for gynæcological disorders.

It is notoriously more common in women than in men, the proportion according to Newman, of Glasgow, being 2·52—30.

Congenital, dislocated, movable, or floating kidney is exceedingly rare, and when it does occur the left kidney is generally found in the hollow of the sacrum (Fowler in "Keating's Diseases of Children").

ÆTIOLOGY.

Indisputable evidence has been published that falls, blows, and severe straining as in parturition or during asthmatic attacks, may dislocate a kidney, and for anatomical reasons more frequently the right one.

I can find no proof that tight lacing is as productive of this displacement as some observers (Roberts and Cruveilhier) think. It occurs with unequal frequency among different classes; indeed it is more common among those who are busily occupied than among the "leisure classes." Thus twenty-four were employed in active domestic duties, ten in teaching, or lighter occupations, and only eight were in easy circumstances—one would naturally consider that the latter were the more addicted to tight lacing. Five (5) of my cases attribute their symptoms to typhoid, and when we consider the rapid and prolonged emaciation following this or any other protracted illness, we can understand the reason.

At the dates of examination, 14 of my patients were decidedly stout, but 25 were thin, 2 being much wasted.

As regards the influence of parturition, I find that 28 were married, and of these 25 had borne children, all except two patients having more than three children, while 3 had no family. Thirteen (13) women were single, and of these 8 were in good condition as regards the body fat.

Loudon lays stress on the presence of malignant disease among his cases, estimating it at 13 per cent. Among my patients, 6 showed undoubted family history of cancer (14·6 per cent), and there is strong evidence of tubercle in 3, and lithiasis in 10.

Personally, I regard these factors as influencing the ætiology only in lessening the likelihood of patients coming of strong and healthy stock, and rendering waste and loss of fat as more likely.

AS REGARDS THE SIGNS AND SYMPTOMS OF MOVABLE KIDNEY.

(1) Some observers lay emphasis on the peculiar sickening sensation experienced by the patient when the kidney is manipulated. In my notes, I find that 14 patients complained of this (34·1 per cent.), and that the larger the kidney the greater the pain evinced. The degree of mobility bears no comparison to the tenderness of the organ.

(2) In thirty cases there was general disturbance of digestion, chiefly flatulent dyspepsia, and pyrosis (73·1 per cent.).

(3) Thirteen complained of constipation, alternating with painless and causeless diarrhoea (31·7 per cent.).

(4) Fourteen suffered from actual vomiting after meals, or while riding in cabs or in railway trains (34·1 per cent.).

(5) Seven complained only of constant nausea, but without emesis.

(6) Seventeen were disturbed by aching pains in loins and limbs, and by dragging sensations in the region of umbilicus; these were made worse by walking or exertion.

(7) In 11 a main feature was enuresis *in day-time*, relieved by taking the recumbent position (26·8 per cent.).

(8) Five non-alcoholic patients noticed, of their own accord, a peculiar symptom (and all were single women), viz., a desire to vomit when rising from bed in the morning, or when leaving a concert-room or theatre.

(9) Eight patients complained of no symptoms referred to abdominal or pelvic organs, and the movable kidneys were found because I searched for them as interesting objects (19·5 per cent.).

(10) Five women only were positive that their symptoms were aggravated during or before the catamenia. Becquet states that there is a close relationship between the ovarian and renal nerve plexuses. In case No. 37, during residence in hospital for other causes, the right movable kidney was certainly swollen and tender prior to the onset of the two monthly periods.

(11) In cases Nos. 5, 23, and 24, recurrent icterus was present, due to pressure on common bile-duct.

(12) Actual dilation of the stomach could only be proved in two cases.

(13) Two cases (Nos. 20 and 39) were treated for hæmaturia and albuminuria, and diminished amount of urine was passed for three days. In each case there were rigors, vomiting, and pyrexia, and considerable shock.

(14) Ten patients stated that they were able to obtain relief from all their symptoms when they sought recumbent positions (24·4 per cent.).

(15) I have attended two patients during confinements, in whom I knew movable kidneys had existed for some time. Neither had any extra trouble from that cause.

(16) Not one had procidentia uteri.

(17) Only in 8 cases did retroflexion or retroversion of the fundus uteri exist

(18) Finally, in 35 cases the right kidney was movable (85·3 per cent.), and in 5 cases the left (12·1 per cent.), and in one case both. Of the whole number, I am obliged to reckon at least 5 as hypochondriacs.

The following cases are briefly narrated as types.

Class 1, where movable kidney is found during examination for symptoms referrible to other causes.

Case 21.—Aged 34, a patient of Dr. Lillies, was seen in consultation. She had two living children, and one miscarriage. Her symptoms arose from a retroverted uterus, and chronic disease of appendages. The right kidney was freely movable, nontender on pressure, and caused her no inconvenience.

Class 2. Here the patient suffers from movable kidney, and is quite unaware of it, the pain being in regions other than renal.

Case 2.—A remarkably well-nourished young lady, aged 22 years. Felt dragging sensation about umbilicus and in loins, as of something twisting among the bowels, the attack coming on "at any time." There was distinct evidence of tubercle in the family, but I could find no trace of it in herself, and she did not lose weight. At her mother's request I examined her under chloroform, and did not find any gynecological reasons for the seizures, but Dr. Grant, whom I called into consultation, diagnosed a movable kidney (the right). As the patient was well-nourished, we advised her to have nothing done, except to wear a belt if the symptoms became worse. She went to England and consulted Matthews Duncan and others, who supported the diagnosis and treatment; but when she returned to Melbourne she passed out of my hands, was operated on (nephrorraphy), and died six days afterwards. During the operation, at which I was invited to be present, the kidney was seen to slightly move during deep inspirations under chloroform. I could never obtain a satisfactory history as to any probable cause for the movable kidney in this case.

Class 3 shows that, under treatment, the effects may be considerably alleviated.

Case 1.—I first saw Mrs. X. on March 6, 1890. She was 42 years of age, had two children. From girlhood she had always suffered from what she said was chronic dyspepsia, and during the past ten years had become remarkably thin. For the last two years her symptoms were greatly aggravated, and she now complained of a constant desire to micturate; food was rejected shortly after being swallowed. She suffered intense pain continuously in right lumbar region, could bear no pressure there, and was unable to fulfil any social engagement. She looked very ill; and as her father, mother, and cousin had died of cancer, her friends were naturally anxious lest some malignant disease was present. Through the courtesy of Dr. Duncan Turner, I saw her in consultation. The right kidney was about double its natural size, freely movable, very tender on pressure, and on deep inspiration moved fully an inch and a half downwards, and had a lateral mobility to same extent. The urine was loaded with oxalates, but neither albumen, pus, nor blood was found.

By rigorous treatment and perfect rest in bed for six weeks, combined with a careful diet and massage, and insisting that all meals should be taken when in a recumbent position, she regained health wonderfully, and was, even under less strict regimen, comparatively free from pain, and sometimes many weeks would elapse without vomiting. I examined her again on August 22, 1892, and found the kidney very slightly movable, much smaller, and not tender on pressure. She states that she can retain urine without discomfort for hours, can enjoy her meals, and leads an active life, but if she attempts undue exertion or straining the pain returns. She has worn corsets adapted to the condition.

Class 4, *Case 7*.—Married, aged 46 years, examined on June 12, 1890. She had four children, the youngest being 9 years old. Has had no miscarriages. Now complains of pain after food, followed by vomiting and prolonged attacks of syncope; pain in the right lumbar region, and frequent desire to micturate during daytime, but could sleep all night without being disturbed. She is of spare habit, very active, and has for years managed a very large hotel. I carefully examined her, and found a retroverted uterus, no evidence of gastric ulcer, but the right kidney was much enlarged, freely movable and tender, descending to the level of the crest of the ilium, and with lateral movement to the umbilicus. The urine contained lithates in abundance, but neither blood nor albumen. She informed me that, seventeen years ago, Mr. T. N. Fitzgerald had diagnosed movable kidney, but said that it was not diseased, and advised her to wear a support. This she had not done, however.

Under treatment the kidney became smaller, the urine normal, and she went to London in 1891, and the diagnosis and treatment were confirmed.

Class 5, *Case 39*.—Aged 38 years, married twelve years, three children, youngest 5 years old; no abortions. Sent for me in December, 1891, to arrange for her confinement, saying she was four months pregnant. I verified the pregnancy; and on learning that, except for a slight jaundice occurring twice during the past eight years, she had had exceedingly good health, I examined the abdomen, and found the right kidney freely movable, scarcely enlarged, and not tender. She was unaware of the fact. She sent for me hurriedly on February 11. I found her in bed, vomiting greenish material; in great pain over lower right abdomen; pulse, 140; temperature, 101 degrees. The kidney was now very much swollen and very tender; she could pass no urine, although there was a constant desire to micturate. She states that she was perfectly well until 10 o'clock that morning, when she sought relief at stool, and during an unusually severe straining she felt great pain in the right side, vomited, and almost fainted. Knowing the former condition of the kidney, I had little trouble in diagnosing that there was torsion of renal vessels, due to rotation of kidney. Dry heat to abdomen eased pain. She was then put in the genu-pectoral position, and retained it as long as she was able. A large enema, given four hours later, acted well. Next day the urine was very scanty, and contained blood and albumen. Two days later, as I had to leave town, Dr. Turner kindly undertook the case; she soon recovered, and there were no signs of the attack or anything abnormal in urine six days afterwards. I attended her in May last, and delivered her of a healthy child without extra trouble, only taking care to commence giving chloroform early in the second stage.

August 22.—The kidney is very much as it was in December, and she is able to move about without pain or discomfort. The urine is normal. No evidence of gall-stones or dilated gall-bladder.

Treatment.—I have nothing fresh to suggest. Remembering the anxiety and annoyance caused by these conditions, I make a strong point of explaining the cause to the patients, and insisting on its comparative immunity from danger. Careful directions as to habits and diet are given, and especially as to position when taking food, to prevent vomiting. They are warned not to ride or take violent exercise, and not to strain at stool.

Some authorities—Kepler among them—consider it so serious that they would at once remove the offending organ; while Loudon, believing that it has never caused death, thinks that it should never be operated on. I believe that these movable kidneys are fairly numerous, and although causing a varying amount of discomfort, can often be endured for many years without serious inconvenience or danger to life.

Constipation is best relieved by daily small enemata; diarrhœa and pain by codeia. Hyper-acidity of urine increases the desire to micturate, and is concurrent with disturbances of digestive tract. This is met by alkalies and diluents. The application of dry heat, and counter-irritation by mustard poultices, give relief. Several of my patients derive benefit by wearing an abdominal belt (lightly made), to which is fixed a crescent-shaped support for the kidneys. But others found greater ease in having all clothing made loose, and do not even wear corsets. I believe in massage employed for six weeks, and the internal use of maltine, and a liberal nutritious dietary. The massage can be employed in any region, except over the kidneys themselves.

DR. HOOPER'S Table of Forty-one Cases of Movable Kidney—Forty treated non-surgically.

No. of Case.	Dates when examined.	Age.	Married or single.	Appearance.	Physical signs.	Family history.	Causes of movable kidney stated.	Notes.
1	6/8/90 26/8/92	40	Married, 3 children.	Very thin	R. kidney freely movable; stomach dilated; hemorrhoids.	Both parents died of cancer, also first cousin and sister had gallstones; two nephews had renal calculi.	From twenty to thirty years had chronic dyspepsia, which made her very thin.	Case more fully reported in paper.
2	3/5/89	21	Single.	Stout & looked healthy.	R. kidney movable, not enlarged; all other organs healthy.	One sister died of phthisis; one brother has tubercle of lung.	Unknown	Case referred to elsewhere in paper.
3	13/5/90	43	Married, 8 children.	Very thin	R. kidney enlarged, tender, and movable; subinvolted and retroverted uterus.	Rheumatic	Rapid pregnancies and heavy house duties.	Fundus was replaced, but symptoms continued.
4	24/5/90	19	Single.	Looks well nourished.	Anæmia; R. kidney movable, but not painful; no dysmenorrhœa.	Mother had cancer of uterus.	Typhoid fever four years ago.	Urine contains copious oxalates.
5	26/5/90	44	Married, 9 children.	Short and heavy	R. kidney enlarged and freely movable; copious urates; had jaundice.	Says there is stone in the family, but history vague.	Rapid gestations; four abortions.	Had an attack of hæmaturia and albuminuria while under my care.
6	10/6/90	22	Single.	Well-made, in good condition.	R. kidney movable and tender; R. ovary prolapsed.	Uncertain	Had very much lifting in hotel.	Work as housemaid in hotel; obtained little relief from treatment.
7	12/6/90	46	Married, 4 children.	Rather thin ..	R. kidney enlarged, tender, and movable; uterus retroverted.	Cancer on maternal side.	Straining in confinement.	Mr. Fitzgerald recognised her condition seventeen years ago.
8	12/9/90	43	Married, 7 children. 2 abortions.	Thin	Mitral regurgitation; retroversion of uterus; left kidney movable and tender.	Uncertain	Rapid gestations.	Had typhoid ten years ago; retroversion treated; urine normal.
9	10/3/91	26	Single.	Well nourished.	R. kidney freely movable and tender.	Uncertain	Had typhoid about six years previously.	Seen in consultation with Dr. D. Turner; improved under treatment.
10	11/4/91	50	Married, 8 children.	Thin	R. kidney movable and tender during past three months.	Tubercle; sister and son died of phthisis.	Rapid confinements.	Mr. Fitzgerald detected the movable kidney eighteen years ago. Urine contains phosphates; very active.
11	25/5/91	35	Married, 1 child, 3 yrs. married.	Thin	R. kidney movable	Rheumatic	Hard work as laundress.	Improved under careful dietary and salicylates.
12	2/5/89	24	Single.	Well nourished.	Both kidneys movable, and stomach dilated; can get splashing sounds there.	Uncertain	Hard work as waitress in hotel.	Seen in consultation with Dr. Grant; did not improve.

DR. HOOPER'S Table of Forty-one Cases of Movable Kidney—Forty treated non-surgically—*continued*.

No. of Case.	Dates when examined.	Age.	Married or single.	Appearance.	Physical signs.	Family history.	Cause of movable kidney stated.	Notes.
13	6/8/91	29	Married, 2 children.	Well nourished.	Left kidney tender and movable; retroverted uterus.	Uncertain	Unknown	Had both ovaries removed later (by chronic disease of appendages for another surgeon). Symptoms unaltered; very hysterical.
14	23/10/91	26	Married 6 months.	Thin	R. kidney movable; uterus and appendages normal.	Unknown	Typhoid	Complained of dysmenorrhœa only.
15	8/12/91	23	Married, no family, married two years.	Very thin	R. kidney large, movable, and tender, it drops to level of anterior superior spine when standing.	Malignant on maternal side; strongly gouty on paternal.	Rough riding in bush, and falls from horses.	Subsequently became pregnant, and aborted at 3 months; uterus was retroverted and treated prior to pregnancy.
16	20/1/92	27	Single.	Very thin	R. kidney freely movable; uterus retroverted.	Uncertain	Hard domestic work ..	Replacement of fundus gave very little relief.
17	28/10/91	28	Single.	Well nourished.	R. kidney movable; constipation marked.	Strongly rheumatic	Unknown	Greatly benefited by rest and treatment.
18	21/3/92	33	Married, 2 children.	Thin	Movable R. kidney; subinvolted retroverted fundus.	Unknown	Difficult and tedious second confinement.	Has very heavy house duties.
19	4/4/92	29	Single.	Stout	Anæmic; mitral incompetency; R. kidney movable.	Strongly gouty	Unknown	Very hypochondriacal.
20	6/10/91	19	Single.	Slight	Anæmic; mitral incompetency; R. kidney very movable and tender.	Strongly rheumatic	Typhoid fever 4 years ago.	Urine contained albumen and blood during acute attack, for which I attended her.
21	6/3/92	32	Married, 2 children	Thin	Retroverted uterus and prolapsed ovaries; R. kidney movable.	Uncertain	Unknown to patient ..	The kidney caused very little trouble; gynaecological treatment beneficial.
22	26/5/92	29	Married, 4 children	Thin	R. kidney movable; both ovaries prolapsed.	Rheumatic	Difficult second confinement.	Sent to me for oöphorectomy, to relieve sickness and dysmenorrhœa.
23	7/4/92	22	Single.	Stout	Jaundiced; R. kidney movable	Rheumatic	Unknown	Much improved by salicylates and general treatment.
24	2/7/92	32	Single.	Thin	R. kidney large and tender; jaundiced.	Unknown	After typhoid fever 6 years ago.	The uterus had recurred thrice; condition of gall-bladder is uncertain.
25	6/7/92	27	Married, 2 children.	Thin	R. kidney freely movable	Malignant on father's side.	Straining during first confinement.	Very active habit.
26	25/7/92	31	Married, no family.	Stout	L. kidney movable; L. ovary enlarged.	Unknown	Unknown	Was about to have ovary removed to relieve symptoms.

DR. HOOPER'S Table of Forty-one Cases of Movable Kidney--Forty treated non-surgically--continued.

No.	Dates when examined.	Age.	Married or single.	Appearance.	Physical signs.	Family history.	Causes of movable kidney stated.	Notes.
27	8/8/92	27	Married, 4 children.	Very thin	R. kidney movable and tender; cervix lacerated and eroded.	Unknown	4 children in 5 years.	.....
28	6/12/91	40	Married, 5 children.	Very thin	Slightly movable R. kidney, and distended ascending colon.	Unknown	During parturition	Hospital case; kidney enlarged during catamenia.
29	13/7/92	38	Married, 2 children.	Thin	R. kidney movable	Unknown	Fall	Had been treated gynaecologically without benefit.
30	20/6/92	23	Married, 1 child.	Stout	R. kidney enlarged and movable ..	Rheumatic	Straining during parturition.	Hypochondriacal.
31	20/1/92	22	Married, no family, 3 years married.	Stout	L. kidney movable .....	.....	Unknown	Had been advised to have metrotomy to relieve symptoms.
32	20/1/92	33	Married, 2 children.	Thin	R. kidney movable; fundus retroverted.	.....	Hard domestic work ..	Fundus replaced; eased headaches and bearing down pains.
33	8/1/92	42	Married, 9 children.	Thin	R. kidney movable; os lacerated and eroded.	.....	Parturition	Improved by treatment.
34	4/5/92	32	Married, 2 children.	Thin	R. kidney movable; lacerated os ..	.....	Unknown .....	.....
35	11/7/92	24	Married, 3 children.	Fairly well nourished.	R. kidney movable, and colon distended.	.....	Heavy work	Improved under treatment.
36	10/10/92	27	Single	Thin	R. kidney movable; stricture of os internum.	Strongly rheumatic	Straining while acting as laundress.	Had metrotomy.
37	3/6/92	27	Married, 1 child.	Thin	L. kidney enlarged; left ovary also; and cellulitis and retroverted uterus.	Malignant	Fall	Kidneys used to enlarge before catamenia.
38	3/3/92	33	Married, 9 children.	Shin	R. kidney; cervix lacerated and eroded.	Uncertain	Repeated gestation	Had "Eunnett's" operation.
39	6/17/91	36	Married, 4 children.	Thin	R. kidney enlarged and tender	Healthy	Straining during parturition.	.....
40	4/5/90 26/5/92	40	Single	Very thin	R. kidney movable	Tubercular	Had a fall from a horse ten years ago.	Improved with belt.
41	17/3/92	30	Married, 1 child.	Very thin	R. kidney movable; left ovary prolapsed.	Rheumatic .....	.....	Not much improved.

The Electro-Neurotone; a New Method of applying Electricity, with Notes on some cases benefited thereby.

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A CENTURY has elapsed since Voltaire produced his famous definition of a physician—"One who poured drugs of which he knew nothing into a body of which he knew less." Since his day a renaissance, so to speak, of medical science has occurred, and to-day one of the chief troubles which worry a medical man is the difficulty of keeping pace with the enormous amount of information which is being annually supplied by medical men from all parts of the world.

In no branch of medicine has the spirit of scientific investigation been more productive of valuable results than in the department of neurology. Affections at one time massed together under the vague title of paralysis, are now accurately differentiated the one from the other, correct and rational therapeutics follows upon correct pathology, and our patients benefit accordingly. The nervous system, as a whole, till within the last quarter of a century, might be viewed as a continent prior to exploration. As the result of the epoch making researches of Hitzig, Ferrier, Horsley, Schäfer, and many other brilliant scientists, we are now enabled to accurately diagnose and localise a lesion in the seat of thought itself, and by operative and other measures, cure diseases which, fifty years ago, would have resulted in a fatal issue.

A Congress, such as the present, offers an opportunity for the review of recent discoveries in medical science, which we should all avail ourselves of. Each one of us is an unit in the vast army of workers engaged in building a pyramid, each one bringing his stone (albeit a small one) to add to the mass, which, when complete, will be *monumentum ære perennius*. Unlike the pyramids of Egypt—monuments of the vanity of forgotten kings—the work we are engaged on will be of practical use and benefit to generations to come, and redound to the credit of our profession, the teachings of which bid us labour not so much for eleemosynary reward, as for the sake of doing good to suffering humanity, whom, like the poor, we have always with us.

The knowledge of the importance of bringing one's mite to the general feast, prompts me to say what I know of an electrical appliance which has been brought under my notice in the last few months, and tried with benefit on several of my patients.

There are three stages in the evolution of all therapeutical appliances:—

1. On the discovery of any therapeutical application it is vaunted as a panacea for all ills (real and imaginary) to which humanity is liable.
2. It passes rapidly into the hands of the quacks, who speedily bring it into disrepute.

The stage of disrepute varies in duration, I should say in inverse proportion to the amount of *éclat* with which the remedy has first been vaunted.

3. After having fallen into desuetude, some quiet workers in the interests of science submit the so-called remedy to a critical examination, with the result that our remedy rises phoenix-like, and is placed in its proper position in our armamentarium of weapons employed against disease.

Electricity has shared the fate common to all other remedies. When first employed medically it was spoken of as a cure-all. Employed in a haphazard and careless fashion it soon disappointed its most ardent advocates, and naturally fell into disrepute. Quackery found a fruitful and lucrative field therein, and every ailment, from hernia to hydrocephalus, was to be cured by wearing an electrical belt or corsot, or by cleaning one's teeth with an electrical tooth-brush, while the last phase of impudence and quackery has been reached in the Mattei boom (now happily exposed) with its rainbow-hued solutions of electricity. From this Slough of Despond, electricity has been raised by the labours of such men as Erb, De Watteville, Buzzard, Ross, Rockwell, and many others whose names will occur to my listeners, and now it stands in its proper place in our magazine, as an agent productive of much benefit, capable of doing good service in competent hands, but, like most good servants, potent for evil when carelessly administered.

The apparatus is essentially Australian in origin, Mr. Hodgkinson having originated and perfected the instrument in Victoria. The distinctive name for it having been suggested by Dr. Naylor of Hobart.

Two metal plates are fixed upon a solid foundation or base composed of insulating materials; these are carefully insulated from each other, and may be made of any required shape or dimensions. These electrodes are charged with a faradic current derived from an induction coil, which, although of ordinary principle in construction, has been specially "wound," both in primary and secondary, with a view of obtaining a current of very high tension, with the greatest possible number of alternations per second. The total length of No. 40 wire used in secondary winding is about 500 feet, and the resistance measures about 276 ohms. This, with the 24-gauge wire used in primary current (wound upon the electro magnet), enables the instrument to work at its best when a primary current of 1.5 volts (of pressure) and not less than 2.25 amperes (of quantity) is available. This can be obtained from a battery of two or more Leclanché cells or a bi-chromate element of half-pint fluid capacity. The strength of current can be adjusted to suit the resistance of the body by using the commutator provided, and in this connection it may be remarked that owing to the careful winding of the coil, the various degrees of current strength are exactly progressive in the advancing ratio of 20 degrees of proportion one to another, the total strength of current being reckoned at 100 degrees.

When these appliances are used, a local action results which will be found to be operative beyond the area in contact with the electrodes, this area varying in size, according to the normal or abnormal conditions of the muscles and nerves. When the instrument is "joined up" with the special extension instruments, a peculiar electrical action will be observed, the current apparently crosses over to the opposite pole of the extension apparatus (when one extension electrode is employed), and we get an electrical reaction both in the area covered by the main instrument and the extension electrode.

By means of the combination of the neurotone and the extension apparatus it is evident that a nerve may be stimulated throughout its course from origin to termination.

Case 1.—F. H., widow, *æt* 37, became decidedly ill in 1881, when she met with a buggy accident; at first she suffered from shock, subsequently from inflammation of the intestines and ovaries; gaining no relief from her doctor she consulted another medical man, who diagnosed ovarian tumour, watched the case carefully for ten months, and advised laparotomy. Patient removed to another colony, where she saw a leading surgeon, who diagnosed the tumour as a myoma, and said an operation was inadvisable. She removed to a country town five years ago, when she received a strain in lifting; this resulted in severe pain and stiffness in lower part of back and legs, with loss of co-ordination in legs. She was then treated by a competent electrician for four months with galvanism. This somewhat improved the condition of the legs, but did not benefit tumour, though Apostoli's method of treatment received a fair trial. Her paralytic symptoms were then pronounced by her attending doctor to be due to pressure, and removal of the tumour was advised and agreed to. Twelve months ago hysterectomy was performed successfully; she made a good recovery. Galvanism and massage were continued, and the consequence was that all pain was absent for two months. But the pains soon returned, and patient removing to Sydney, came under my care at St. Vincent's Hospital. While in that institution she was subjected to a variety of treatment. Galvanism, faradism, the combination of galvanism and faradism as introduced by De Watteville, static or frictional electricity, were all employed with massage, and patient derived no benefit therefrom. All varieties of anodyne drugs were employed futilely, and morphia hypodermically alone seemed to control the pains. After being in the hospital for many months I advised her to leave, and hearing of Mr. Hodgkinson's appliance, advised her to try it. This she has done, with the result, that from the period when she first went under treatment she has experienced relief from her constant pain, she can now do without morphia, which previously was a necessity to make life bearable, motility has improved, her muscles now respond to the faradic current, and she expresses herself as feeling much better. She is not cured, but expresses herself as feeling much improved. Unfortunately, she fell about a fortnight ago and injured the muscles of the thigh and ligaments of the right hip-joint. This has naturally thrown her back, but she is now commencing to mend once more, and I hope in a few months to send her home.

Case 2.—N. M., female, aged 32, fell ill after an attack of *la grippe* eighteen months since. First felt disturbances of sensation in the extremities commencing in the feet and hands, and extending to the knees and elbows. Numbness, tingling, formication were soon followed by swelling of the ankles, knee-joints, wrists, and elbows. Loss of muscular sense and motor paresis passing into paralysis, with inco-ordination, soon developed; the pathognomonic symptoms of "dropped wrist" and "dropped foot" being present.

She was treated by various doctors, who diagnosed her case as rheumatism, and treated her accordingly.

When first seen by me the characteristic symptoms of peripheral neuritis were present, pain and stiffness of the joints of the extremities being the most troublesome features of the case. After trying a course of baths and a variety of medical treatment for some months, finding she did not improve,

but steadily became worse, I advised her to try the effect of Mr. Hodgkinson's appliance. The result has been that after six weeks' treatment, by means of the neurotone (without the employment of any other therapeutic appliance) her pains have disappeared entirely, the stiffness of the joints has passed off, and she declares herself "a new woman." I have had to stop all treatment in her case, on account of her impending accouchement, but in view of the great improvement in her case, will certainly recommend treatment as soon as her puerperium has passed.

Case 3.—T.Q., male, age 46 years. Had rheumatic fever in New Zealand seventeen years ago; recovered, with stiffness in left hip-joint, and numb feeling in the left thigh; this gradually passed off; remained well for eight years; he then, after a very hard day's work, suddenly felt a pain in the left hip-joint; becoming alarmed, he gave up work, but found that rest did not improve his condition at all, as what he describes as a muscular cramp in the left groin developed, which quite prevented him from working or walking. He received a variety of treatment, electrical and medical, but to no purpose. He got steadily worse, and removed to Sydney four years ago. The muscles of the thigh rapidly wasting caused him much alarm, and he consulted me first about six months ago.

I found that the hip-joint was very stiff, in a condition of partial ankylosis, due to the condition of the ligaments, the muscles of the thigh being much atrophied. It was clearly the atrophy of disuse, as there was no reaction of degeneration, the muscles readily responding to mild galvanic and faradic stimulation, the polar reactions being normal. Locomotion was difficult, and he could not put the weight of his body on the limb. I subjected him to a variety of treatment—massage, electricity in all its forms (galvanic, faradic, and frictional)—and all to no purpose, when I advised him to try the effect of Mr. Hodgkinson's invention. The result has been that all his pains have gone, he can now move his limb with much more freedom, the muscles have improved in nutrition, and he can support the weight of his body on the affected leg. I hope, at his present rate of progress, that a couple of months more treatment will see him permanently cured. I think that the lesion in his case must have been rheumatic inflammation of the ligaments of the hip-joint with consequent atrophy of the surrounding muscles from disuse.

These three cases, with a fourth already described by my brother, Dr. W. H. B. O'Neill, in the *Australasian Medical Gazette*, have all been treated by means of Mr. Hodgkinson's instrument. What have the results been? In all a greater sense of well-being has been induced, the current has had a sedative influence in all the cases, more marked than the result produced by other methods of applying electricity. The mildness of the weakest strength of the current, the steadiness with which it can be increased, the portable character of the instrument, and the ease with which "petrissage" can be carried on while employing it, all commend themselves to me as points worthy of consideration, while there can be no doubt that the ability it confers upon one of being able to act upon a nerve at its origin, during its course, and upon the terminations of the nerve, by means of the extension apparatus, exhibits a combination of qualities which should commend the instrument to our serious notice.

The cases I have quoted have all been under a variety of treatment, extending over lengthened periods. From the duration and severity of the symptoms it is evident that they were manifestly severe tests for the apparatus to be subjected to. The results so far have been satisfactory to

me, and I would ask in conclusion that my professional colleagues should essay the treatment for themselves, in order that a larger field of experience may still more severely test this latest production of mechanical ingenuity.

In all of my cases undoubted organic disease existed; in all the possibility of hysteria and hysterio-mimesis was carefully eliminated.

The success which has been attained in such unpromising cases leads me to hope that more brilliant results will be secured in attacking cases of more recent origin.

Notes on the Rational Treatment of Phthisis.

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IN this paper the author drew attention to the brilliant researches of Koch on the tubercle bacillus, and of Metchnikoff on phagocytosis. In view of the correctness of Koch's hypothesis, that the tubercle bacillus is the cause of phthisis, "our line of action is clearly to destroy the bacillus, prevent more from developing, and put the human organism in such a state that it may withstand future attacks."

With regard to the first indication—the destruction of the bacillus—Dr. O'Neill held that "Creasote will fulfil all the conditions required."

The second indication—"the repair of the damage done by the microbes, and the raising of the tone of the system is to be met by careful attention to ordinary hygienic rules, by careful diet, especially by the consumption of fatty foods, and the avoidance of all excess."

The author emphasised the importance of early detection of the disease. "Taken in the early stages ere excavation has set in, I believe the majority of cases of phthisis are curable."

He also pointed out the necessity for microscopic examination of the sputum; and proceeded to state the satisfactory nature of the results obtained by the use of creasote in doses gradually increased from one or two to (in some cases) 20 or 30 minims in the twenty-four hours, the average dose tolerated being 5 to 10 minims per diem, this being supplemented by the wearing of an oro-nasal respirator medicated with creasote, carbolic acid, and chloroform—equal parts.

The importance of using the purest creasote was insisted upon, and the beneficial effects of Oppenheimer's cream of malt, oleum morrhue, and hypophosphites alluded to.

The Disinfection of the Alimentary Canal.

JOHN MILDRED CREED, M.R.C.S., Eng., L.R.C.P., Edin.

President, New South Wales Branch of the British Medical Association.

FOR some years it has been my practice to treat all cases of disorders of the alimentary canal, which exhibit symptoms likely to be the result of the action of septic germs, by the internal exhibition of some medicine which is destructive to bacterial life. Among these are sulphurous acid, the hypsulphites, the preparation of chlorine, carbolic acid, and perchloride of mercury. Latterly I have in such cases almost entirely confined myself to the last of these germicides, which I have found best carries out the action sought for. As a matter of course it is given in minute doses, these generally being either $\frac{1}{10}$ or $\frac{1}{20}$ of a grain. In prescribing, these quantities are convenient, as a grain dissolved in a 10 or 12 ounce bottle of distilled water, and this solution administered in 3 doses every hour, or in some urgent cases, for the first few times every half-hour, almost invariably fulfils the object in view. By this means the stomach may be disinfected before food is taken when the patient suffers from fermentative action, so frequently the accompaniment, if not the cause of dyspepsia. So effective is it in such cases, that patients who have once used it will rarely be without the medicine. Administration for a few days generally frees the person taking it from all flatulent distress. The mixture should then be omitted until the recurrence of the distension again necessitates its use. It is equally effective when the gases are created in the intestines. If diarrhœa, consequent on fermenting matter, is present, a few doses exhibited every hour generally neutralize the septic germs, when the residual faecal matter being disinfected, may remain in the intestines comparatively harmless for evil until it is discharged in the ordinary course. I think this an important point, for without the contents of the bowels are rendered innocuous by the effect of some germicide it is necessary, as is now the usual course, to quickly evacuate the offending substance by the exhibition of an aperient.

The avoidance of this necessity is of manifest advantage, especially if the patient has been weakened by frequent fluid purging. Under such circumstances I have, in my own person, found the perchloride of mercury so effective in checking disturbance as to apparently have direct sedative action, though in some cases it may be well to follow it up after a few hours administration by one or more small doses of some preparation of opium to relieve persisting irritation.

The advantage of this treatment during the prevalence of an epidemic of cholera is very manifest. As in the treatment of diarrhœa it avoids the necessity of early purgation to relieve the intestines of their contents, when this ailment may be but the premonitory symptom of the more dire disease.

All writers of experience are especially emphatic as to the danger of administering purgatives during an epidemic of Asiatic cholera.

Happily we have had no opportunity in Australia of testing the suggested efficacy of the treatment, but I firmly believe that with proper care as to diet we have in the administration of small doses of perchloride of mercury a prophylactic which will be most potent in preventing the onset of that fatal malady.

I may here remark that the exhibition of this salt in the treatment of diarrhoea is claimed by homœopaths as an example of the truth of their asserted law of *similia similibus curantur*. It is really nothing of the kind, for though it is true that poisonous doses of corrosive sublimate, set up dysenteric purging, when used in small doses it acts in a truly allopathic manner, by destroying the septic germs which produce the intestinal disorder.

SECTION OF SURGERY.

President's Address.

BY W. GARDNER, M.D. *et* Ch.M., Glas.

Honorary Surgeon to the Children's Hospital, Melbourne; formerly Senior Surgeon to the Adelaide Hospital, and Lecturer on Surgery at the Adelaide University.

GENTLEMEN,—The position in which I find myself to-day is not one of unalloyed happiness, for, whilst deeply sensible of the honour which has been conferred upon me, I am also fully alive to the responsibilities of the office of President of the Surgical Section of this Congress, and to the difficulty which confronts me in presenting to you material worthy of your acceptance. My first duty is to thank the committee of the Congress for the confidence they have reposed in me by electing me to this distinguished position. Your choice must, I feel, have been dictated rather by the circumstance that I have recently visited the great centres of medical thought and education, than suggested by any merit of my own. When the formal invitation was sent to me by the committee, I accepted; but as the honour was, probably, in part conferred upon me as Senior Surgeon to the Adelaide Hospital and Lecturer on Surgery to the Adelaide University, I deemed it my duty to inform the committee that I had decided to change the scene of my labours, by removing from Adelaide to Melbourne. So decided, however, was the answer, and so graceful the terms in which it was conveyed by your honorary secretary (Dr. Knaggs), that no avenue for honourable retreat was left open. My predecessors (Mr. FitzGerald and Dr. Stirling) have rendered my task more difficult by the excellent character of their addresses. By the practical knowledge of modern surgery which the former so pre-eminently possesses, he was easily able to rivet the attention of his audience; while the latter treated his lofty theme in his well-known scholarly style.

The choice of a subject gave me a considerable amount of thought, and at last I decided to lay before you a short account of the present state of surgery, illustrated by a few selected subjects, together with gleanings from my travels.

The aim of all true surgery is the preservation of human life, or its prolongation for a more or less lengthened period, the increase of human happiness by the restoration of function to parts, and the removal of tumours or deformities. Consequently our object, as scientific surgeons, should be to reduce to a minimum the mortality of surgery, without selecting our cases for results only, or denying to sufferers the possible chance of cure, or prolongation of life, by a difficult or dangerous operation. To attain these ends, the first and most important thing is the proper treatment of wounds, and I shall direct your attention to that subject, in regard to which immense progress has been made in our time.

Within the last twenty years the laborious researches of Pasteur and the genius of Lister have shed a flood of light upon the subject, and the latter has evolved out of "the anarchy of thought and chaos of the mind" a well-defined plan, which, though undergoing constant changes in its *technique*, has resulted in an almost incalculable saving of human life, and a never-to-be-sufficiently-appreciated enlargement of our sphere of work and duty. Lister has conclusively shown that the cause of putrefaction in wounds is the addition of some agent which has the power to multiply indefinitely in the animal fluids and tissues, and thus becomes the cause of the constitutional symptoms which follow. The view which he adopts is, that the true cause of putrefaction in wounds is the presence of micro-organisms, whilst others regard the septic changes as depending upon some as yet undefined cause acting from without; others again say, in a simpler and less scientific manner, that want of cleanliness is the *septikos*, or unknown factor, which is at work. The balance of evidence is, I am bound to say, in favour of Lister's theory; but when we find the great majority of surgeons unanimous as to the beneficent results which have followed the general adoption of antiseptic or aseptic treatment, we can well afford to leave the theoretical question till experimental research and clinical work give us the desired proof.

At this point, certain terms which have been used by Sir Joseph Lister and Mr. Watson Cheyne must be defined, in order to make clear the changes they have undergone, and the wider signification they have come to bear by a process of evolution:—"Listerism" is the term used for the treatment of wounds by the carbolic acid spray, the protective, the gauze, and the mackintosh, with the use of carbolic acid for the cleansing of instruments and sponges. In thus defining the method, I am quite aware that Lister has abandoned the spray as an unnecessary addition, for I have had the opportunity of seeing some of his excellent work in King's College Hospital. Watson Cheyne defines "aseptic surgery" as the term used for the method of keeping from wounds the *septikos*, that agent or substance which, when present in wounds, causes them to become putrid and to infect the patient. "Antiseptic surgery" is the term applied by him to that form of surgery in which substances calculated to lessen the chance of putrefaction are used. From these definitions, it will be evident that it is impossible to draw any absolute line of demarcation between the two methods, except that the one is negative and the other positive. The simplest form of aseptic surgery is surgical cleanliness, and even this is antiseptic, in so far as it attempts to prevent any cause of putrefaction reaching the wound, either from surrounding objects, from the instruments or sponges, or from the hands of the operator or his assistants. The term "aseptic surgery" has also been applied to the use of antiseptic substances for the cleansing of the instruments and the skin before the operation commences. The varied uses of these terms, therefore, render it desirable that their meaning should be definitely settled; and I would suggest that aseptic surgery should be held to include all methods which aim at the exclusion of septic influences from wounds, without any use of antiseptic substances to the wound itself. Under this heading would come Lawson Tait's method of abdominal surgery, which aims at leaving no fermentescible material in the wounds, and insists also upon the perfect cleanliness of instruments, sponges, hands, and dressings. Antiseptic surgery should include all forms of aseptic surgery, with the addition of the use of antiseptic substances to the wounds, either as preventive against sepsis, or against its increase. All aseptic surgery is in one sense antiseptic, but all antiseptic surgery is not aseptic.

Understanding the terms thus, the question next arises—What are the best methods of ensuring surgical cleanliness? Lawson Tait boasts that he uses unfiltered water from the tap, germs and all; but then it is boiled, and he is especially careful to leave nothing fermentescible for the germs to feed upon. As a result of my observations, I have come to the conclusion that dry heat is the best means of rendering instruments, sponges, towels, &c., aseptic, and to attain this end, I brought out with me from Paris a sterilizer which can be worked from an ordinary gas jet. The instruments, sponges, &c., to be sterilized are placed in aluminium boxes, and these are then put in the oven and the gas lighted. Thermometers are attached to the sterilizer, by which the temperature can be read, and I find that it takes not more than half-an-hour to raise the temperature to between 320° and 350° F. On one occasion, owing to neglect, I raised some sponges to a temperature of over 400° F., without the least damage to their appearance or texture. The newest form of sterilizer is the invention of Dr. Hertoghe, of Antwerp. In it alcohol is used; and by the kindness of Messrs. Gudenag Frères, of Paris, I shall be able to exhibit one of them to the Members of the Congress.

There are so many factors at work in the production of results in surgery, that we must be careful not to dogmatise too much. In a new building, and in pure air, results of the very best kind may be obtained by aseptic surgery of the simplest nature, or by some simple variety of antiseptic surgery; whilst in a hospital, which has been rendered impure by the presence in the wards of large numbers of septic cases, it will need the strictest Listerism to secure similar results. After a time, of course, these same institutions may become so clean that equally good results may be obtained by simple aseptic surgery. We must, therefore, beware of saying that certain manipulations are either necessary or may be dispensed with, as the necessity or otherwise of these depends on the state of the building, the purity of the air, and the nature of the special case. "Hospitalism" has been banished from the oldest and most unscientifically constructed hospitals by the use of the antiseptic method of treating wounds, and it is now possible for a careful surgeon to achieve, in many of the previously condemned buildings, the very best possible results. The ideal surgery of the day is aseptic surgery, because the majority of antiseptics have a more or less injurious influence, either by poisoning the general system if used of effectual strength, or locally, by irritating the wound, and hindering cicatrization.

The part played by the drainage tube in surgical practice has been conspicuous, but its use has the obvious disadvantage of retarding healing, and in certain cases permitting the entrance of organisms. Evidence is accumulating on all sides that its use can be considerably curtailed. Last year I had the opportunity of seeing, in the practice of Mr. Treves, at the London Hospital, two remarkable instances of this change. The first was an ablation of the upper extremity with the scapula, by Paul Berger's method, which, as you are all well aware, consists in excising the middle third of the clavicle, with double ligature of the sub-clavian artery, and division of the vessel between; then an antero-inferior flap is fashioned, and the brachial plexus divided; lastly, the postero-superior flap is made, and the extremity removed by dividing the tissues holding the limb to the trunk. The bleeding was insignificant, no drainage tube was inserted, and the wound healed by first intention. The second case was one of iliac abscess, and was treated by Mr. Treves, after Barker's, now well-known plan of thoroughly cleansing the walls of the cavity by Turkey sponges mounted on handles, with which the abscess-walls are briskly rubbed until nothing further comes away, and the

wound is thoroughly and completely closed. This case also healed perfectly, and when I examined the patient with Mr. Treves three weeks after, no fulness whatever could be detected in the iliac region. I have no doubt but that, with care and attention to details, equally successful results may be frequently obtained. Welch points out two important objections to the indiscriminate use of drainage tubes, viz., that "in these tubes any bacteria which may get in find protection against the bactericidal influences of the tissues and animal juices," and that "bacteria may travel by continuous growth, or in other ways, down the sides of a drainage tube, and so penetrate into a wound which they otherwise would not enter." He also says that he has repeatedly been able to demonstrate that the white staphylococcus, found so commonly in the epidermis, has entered a wound in this manner. It has been proved that, in small cavities in healthy patients, blood-clot may be left with perfect safety to form a scaffolding on which new tissues may be built up; but, personally, I prefer to remove all pabulum for the micro-organisms, as well as to prevent their entrance, and thus have the most perfect security against septic changes taking place. I am, therefore, a most thorough believer in the importance of a vigilant hæmostasis. The aseptic treatment of the skin is also of importance. We learn from the work of the bacteriologists that at least one hundred different kinds of micro-organisms infest the skin, and, therefore, the cleansing of this becomes one of our most important duties. Stitch-suppurations are due either to imperfect cleansing of the skin, the hair, and the sebaceous ducts or follicles, or to the introduction of sutures which have not been sterilized. The free use of soap and water, with a sterilized brush, followed by the application of alcohol, ether, and an antiseptic, should be the means employed. In the putrefaction of wounds caused by the presence of micro-organisms, we have the bane of surgery; and in antiseptic surgery, we have the antidote. But it is better to avoid the bane, and not require the antidote, and the ideal surgery of to-day is of this kind, viz., aseptic.

Hitherto, I have been considering the artificial means of warding off or counteracting sepsis, but I would now ask you to consider the natural allies which we may summon to our aid in the warfare against it. In this connection, we have the phagocytic action of the leucocytes and fixed connective tissue cells, first discovered by Metchnikoff, and now more fully investigated by Rosser, Feltheisen, Ruffer, Wood, Maxwell Ross, and others, which serves to explain many of the problems which hindered the general acceptance of the antiseptic theory. Whether immunity from infective disease is acquired by the influence of the body fluids, or by chemotaxis, or by phagocytosis alone, or by the combination of one or more of these processes, must be left at the present time undecided; but every surgeon should study the present position of the phagocytic theory, by reading the series of elaborate papers by Dr. Sims Woodhead, published in the *Lancet* in the early part of this year. They bring within the reach of English readers the most reliable account of the "bearing of recent biological researches on the practice of Medicine and Surgery." The interest of the subject is intense; for the pitched battles between the micro-organisms and the leucocytes, and the overthrow of one or the other, read more like fairy tales of romance than sober scientific facts pregnant with meaning; but a study of them will widen one's horizon, and lend an additional charm to our daily work.

But it is not only in regard to sepsis, in its narrower sense, that bacteriological studies have given us welcome aid. From Padua comes a report of successful experiments in the treatment of tetanus, founded upon the work of Behring and Kitasato. These observers showed that "the blood of animals

which have an artificial immunity against tetanus, when injected into susceptible animals, preserves them from fatal infection with virulent cultures of the bacillus of tetanus." They have also shown that "the toxic substance—toxalbumin—present in a filtered culture of the tetanus bacillus, is neutralised by admixture with the blood of an immune rabbit." Two Italian observers—Tizzoni and Cantani—have isolated the "tetanus anti-toxine" from the blood of immune animals, and with it they have treated a case of traumatic tetanus successfully. The anti-toxine was obtained from the blood-serum of a dog rendered "strongly immune" against tetanus, and four injections were made, amounting in all to eighty centigrammes of the anti-toxine. Five successful cases have since been reported, and if, after further use, its curative powers are found to be absolutely certain, may we not with reason look forward to the day when a patient showing signs of septicæmia may, in like manner, be injected with some as yet undiscovered anti-toxine, and saved?

Since last Congress I have visited hospitals in India, Ceylon, England, Scotland, France, Germany, Switzerland, Austria, and Italy. In India and Ceylon the treatment of wounds is antiseptic, but necessarily the degree of thoroughness with which the antiseptic treatment is carried out varies greatly, owing to the vast numbers which have to be treated, and the necessity of keeping down the expenses. Traumatic tetanus, that terrible sequela of contaminated wounds, has been greatly diminished in frequency by the introduction of aseptic or antiseptic measures, and no more powerful argument in support of the septic theory of the origin of tetanus could be adduced than this fact. This result has been brought about by what may be termed a modified antisepticism, and preceded the discovery by Kitasato, Peiper, and others, that the disease was accompanied by the presence of bacilli and a toxalbumin in the blood, which is a product of these organisms. In Scotland, which has the honour of being the birthplace of antiseptic surgery, the practice is of the highest degree of excellence, especially in the hands of such men as Macewen, Ogston, Cheine, Duncan, Berry Hart, and a host of younger men who will not readily let the old traditions die. Turning to the English schools, we find work of the very highest excellence done in theatres which lack much of the aseptic magnificence of Hamburg, Berlin, or Göttingen. Victor Horsley practises Listerism pure and unaltered in all his work, which, as you know, is connected with the development of the surgery of the nervous system. At the Women's Hospital, Bantock discredits all antiseptics, maintaining that they are unnecessary and injurious in the abdominal cavity, provided that a perfect asepsis is procured by the use of boiled water, with a complete removal of all fermentescible material. To secure this, hot water douching is freely used, accompanied by drainage when considered necessary. The surgical supremacy of France, which, in the days of Dupuytren, Nélaton, and others was undoubted, has since suffered from a long period of stasis, if not even worse. But a magnificent revival has occurred, which places her again in the front rank in surgery, as surely as her immenso recuperative commercial powers have undeniably brought her once more into the rank of a nation of the first order. Dr. Terrier carries out the antiseptic principle so thoroughly that he has now two theatres—one for the treatment of all wounds made by the surgeon, which, therefore, can be treated on aseptic principles; the other, for the treatment of wounds which are either doubtfully, or certainly, contaminated by septic-forming materials. Sterilisation of instruments, aseptic surroundings, subjective and objective cleanliness, are the means whereby his admittedly splendid results are achieved. Further, bystanders who are

not rigidly prepared for acting as assistants, are not permitted to touch the patient or area of operation—a point which should be much more rigidly enforced in the operating theatres of Australia than is at present the case. In Germany, the antiseptic treatment of wounds has reached its highest degree of development, and in the Cliniques of Hahn, Bergmann, Gusserow, Olshausen, and Martin, may be seen excellent work carried out in faultless style by masters in their art. The buildings in which they perform their operations cannot be surpassed, either for cleanliness or for perfection of detail. Austria and Switzerland follow the same careful system of antiseptic treatment as in Germany, but the surgeons in these countries have not the same palatial structures to work in. Italy, too, burdened as she is by her necessities in regard to the Triple Alliance, has yet a band of surgeons, such as Gritti, Comolli, Duranti, Postempski, who carry out the antiseptic treatment of wounds in the very best style, but in buildings which will require much improvement before they will be fit to be exhibited with any satisfaction to the International Congress of 1893. The Government is, I am happy to say, just now engaged in making the necessary reforms. To the Italians, British surgery is indebted for the greatest professional honour which has ever been conferred upon it by a Continental nation. The magnificent Policlinico Umberto Primo, or Medical and Surgical Hospital and School of Rome, is to have its two principal façades ornamented with bas-reliefs, in honour of the two men who, in the opinion of our Italian brethren, have conferred the most signal benefits on Medicine and Surgery. Medicine is to be represented by Morgagni, of Padua, the pioneer of Pathology; Surgery, by Sir Joseph Lister, the author of the Antiseptic System. This will be an enduring monument to the genius of our great British surgeon, and will be visited by surgical pilgrims to the Eternal City in the same way as they now wander up the steps of the Capitol, to gaze upon those marvels of sculptural and anatomical work contained in the room of the “Dying Gladiator.”

The next subject to which I would direct your attention is Abdominal Surgery. This department of surgery has developed most remarkably during the last four years, and it is the one to which I devoted the most of my attention during my absence. In England, where the practice of Lawson Tait has largely dominated its methods, it is the custom to open the abdominal cavity by a small incision, not in general exceeding three inches, and to extend it only when the extension is demanded by the exigency of some unusual difficulty. In France the practice is similar; but in Germany, especially in the hands of Martin, one of the most brilliant surgeons of our time, an incision is almost always made from the umbilicus to the pubes. The major part of the small intestine is then withdrawn and laid upon the abdomen above the umbilicus, where it is covered with warm sterilised towels, carefully guarded by an assistant. The operator then proceeds in the usual way, but sits between the legs of the patient, who is lying on a low iron table, the middle part of which can be withdrawn, to enable the dressings and bandages to be applied without difficulty. By this method, great facility is given for the treatment of all pelvic pathological conditions, and such an eminent authority as Dr. Berry Hart tells me that he thoroughly approves of this method in difficult cases. To get rid of the chance of adhesive inflammation attaching the intestine to the abdominal incision, Dr. Martin, before stitching up, places a large sterilised sponge, saturated with pure olive oil, in the abdominal cavity, where it remains until the sutures have been introduced. Those of you who have met with intestinal obstruction after abdominal sections, caused by adhesion of intestine to the abdominal wound, or to the site of separated adhesions, may be inclined to test a proceeding which such

an eminent authority recommends. When any part of the peritoneum has been laid bare during an operation, the use of omental grafts has been attended with success. Separate suturing of the peritoneum, which is used by most of the best surgeons in France, renders fixation of the intestine to the abdominal wound less likely to occur, whilst at the same time the separate suturing of the structures of the abdominal walls is, by many surgeons, considered to lessen the risk of the formation of ventral hernia.

The work of Dr. Senn, of Chicago, on the "Surgery of the Stomach and Intestines," must be given the pride of place in any account of recent improvements. No surgeon now-a-days should consider himself competent to operate in abdominal cases unless he has thoroughly mastered, and is prepared to put in practice, the principles so clearly enunciated by Senn. The enlargement of the field of surgery emphasises the necessity which exists for the physician and surgeon to work together, so that patients may have at the earliest possible moment, after the formation of an accurate diagnosis, the benefit of surgical assistance, whether of a curative or palliative nature. On the other hand, I wish to put on record a most emphatic protest against a tendency, which is showing itself in some quarters, to open the abdomen upon the slightest pretext, making the diagnosis and the remedial measures proceed simultaneously. Such work does away with the exercise of the thinking powers, and will undoubtedly lead to the performance of many unnecessary and ill-timed operations. We must be scientific observers of disease first, and dexterous surgeons afterwards, as a result of a cautiously made diagnosis, which will in the majority of cases prove also to be approximately correct. It may be justly stated that the unnecessary opening of the abdomen is as much a surgical calamity as the unnecessary opening of the knee-joint. I entirely agree with the great French surgeon Trélat, recently dead, who declared himself a sworn enemy to that school of surgery, the followers of which, being always armed, believe that they can dispense with diagnosis.

The substitution of sigmoid or inguinal colotomy for the lumbar operation, has been one of our most signal advances. Not that there is anything new in the method, for it was proposed by Littre in 1710, but it remained an operation rarely performed until its revival by Freer and Pring. Then followed a long interval, during which the operation was entirely superseded by lumbar colotomy, as suggested by Callisen, of Copenhagen, and first carried out with success by Amussat. The ascendancy of lumbar colotomy was largely due to Mr. Bryant's advocacy, and his admirable results. The inguinal operation was revived by Mr. Reeves, and has been warmly taken up and recommended by Harrison Cripps, Treves, Allingham, and others. My own experience of lumbar colotomy is curiously small, considering that in the last 2,000 operations of all kinds which I have done, there have been only six examples, but they all recovered from the operation; and one who, at the time of operation, had a protruding cancer at the anus, lived in comparative comfort for three years, and was able to follow his employment as a labourer until within a few weeks of his death. I once experienced a difficulty in finding the bowel, but overcame it by using an ordinary pair of bellows to distend the bowel, and I think that, with the use of Lund's Insufflator, no difficulty can ever be met with, unless the bowel be abnormally situated. In one case, I saw a surgeon open the small intestine by mistake, and the error, which could not occur in an inguinal operation, was discovered only at the *post-mortem*. The inguinal method is attended with the disadvantage of opening the peritoneal cavity, but against this may be set the advantage of being able thoroughly to explore the seat of obstruction,

at the same time doing away both with the risk of opening the bowel below the obstruction, or of opening the small intestine instead of the large. Prolapse seems equally common after both operations, but the risk of this may be lessened by pulling the proximal end of the gut well down before stitching. In the case of the inguinal method, Allingham's plan may be adopted, of passing a stitch under the bowel through the mesentery, thus forming a spur; or, as suggested by Harrison Cripps, by allowing two-thirds of the exposed portion of the bowel to be above the stitches. In carefully performed operations, excellent control may be obtained, and what is practically an artificial sphincter established.

Excision of the rectum for cancer should only be performed in cases in which the disease can be thoroughly removed, and in this respect bears the same relation to lumbar and inguinal colotomy that pylorotomy does to gastro-enterostomy. In favourable cases, an attempt to remove the disease should always be made by the ordinary, or by Kraske's method; and failing a reasonable prospect of this being done successfully, the palliative operations should be performed early, for, by preventing the flow of irritant matters over the surface of the growth, they necessarily tend to lessen the rapidity of its increase, and so prolong the life of the patient.

Gastrostomy should be performed, in cases of œsophageal cancer, as soon as there is difficulty in regard to the passage of liquid food. It will be obvious, however, that pylorotomy and gastro-enterostomy will necessarily be recommended and agreed to at an earlier date than either colotomy or gastrostomy, for the former of these is followed by a condition which is excessively disagreeable to a sensitive patient, and the latter deprives the patient of the satisfying pleasure of taking food by the natural channels. The opening into the stomach must be no larger than will admit a No. 6 red rubber catheter, and if this be attended to, and the hole blocked for a few minutes after the withdrawal of the catheter, no excoriation or even redness of the surrounding skin need be produced. On December 12th, 1888, I performed the first stage of this operation on a man who had been suffering from œsophageal cancer for six months. The cervical glands were enlarged on both sides. Five days after, I opened the stomach with a tenotomy knife, and fed him with milk, eggs, and soup. His weight, which was 9 st. 8 lb. before operation, steadily rose till it reached 10 st. 8 lb. He lived in comparative comfort for five months, and only died then from the pressure of enlarged glands on the trachea, as he would not consent to the performance of tracheotomy. Pylorotomy, although an operation of the very greatest magnitude, has yet, I believe, in suitable cases, a future before it, for M'Ardle has shown that more than one-half of the cancers of the stomach which he examined *post-mortem* were in the pylorus, and in more than one-half of these there were no adhesions and no glandular enlargement. The greatest element of danger in the operation is the length of time taken in the suturing, but Mr. Rawdon, of Liverpool, has lessened this by closing the upper part of the stomach, and then using decalcified bone-plates to join the lower portion of the stomach with the duodenum, fortifying the anastomosis by interrupted sutures. When in Rome, I saw a most successful case by Professor Durante, who followed the method of Billroth and Wölfler. The latter surgeon has reported a case free from recurrence at the end of five years. Professor Billroth, of Vienna, Professor Kocher, of Berne, and Mr. Jesset, of London, have introduced successfully a method which will be of great value when the duodenum and the stomach cannot be approximated. They remove the growth, close both stomach and duodenum, and then perform a gastro-jejunostomy. By this plan, a growth involving more than the

pylorus may be removed. Loreta's operation for digital divulsion of the stenosed pylorus has been repeatedly performed during the past few years, and I had the pleasure, when in London, of seeing Mr. Treves' third case. The first case in Australia was reported by me to the Melbourne Congress, and I am happy to be able to state, on the authority of a former colleague, that the patient is now, four years later, in the enjoyment of perfect health. At the time of operation, a No. 6 gum elastic catheter could be passed with difficulty. Since that date, I have operated on another patient, who was greatly benefited for some months, and then died from hæmorrhage proceeding from an ulcer near the pylorus. The contraction was in this case secondary to the ulceration, yet at the *post-mortem* examination the pyloric orifice was still quite normal. Like many another good operation in suitable cases, it has been applied to unsuitable cases, in which no real contraction existed. Pyloroplasty, by Mickulicz's method, has also been successfully applied in cicatricial stenosis. Removal of a portion of the wall of the stomach has been employed, as a means of treating aggravated cases of dilatation of the organ; and an ulcer of the stomach has been resected by Postempski, of Rome, with success.

The surgical treatment of intestinal obstruction has been brought within the domain of practical surgery by the experimental work of Professor Senn, supported by the results of his clinical experience. Dr. Connel, Superintendent of the Milwaukee Hospital, suggested to Professor Senn the use of perforated plates for making lateral apposition, and after experiments with various substances, he finally selected decalcified bone-plates, made from the compact layer of an ox's femur or tibia. This suggestion was worked out by experiments on dogs, and proved to reduce the time necessary for the operation from one hour or more to, at most, fifteen or twenty minutes. This operation is the most important advance which has yet been made in intestinal surgery. Abbe, of New York, has drawn attention to the tendency of the openings to contract; this has been noted, and experimental work is needed to settle and overcome this objection.

Circular enterorrhaphy, which even in the hands of expert surgeons occupied a very long time, has now been to a large extent replaced by a rapid operation, with the use of approximation discs. To obviate the risk of leakage at the mesenteric attachment of the bowel, those surgeons who performed circular enterorrhaphy had strengthened the weak spot by the transplantation of omental flaps to cover in the line of suture, but the proximal end was left in connection with the omentum, thus risking the formation of intestinal obstruction at some future time. Professor Senn has shown that omental grafts, completely detached, may be used to cover in the line of suture, and in a few hours they become firmly adherent to the intestinal surface with which they have been brought in contact. Proof that even considerable portions of the intestine may be physiologically excluded by short-circuiting, that is, by approximating the intestine above the obstruction to the intestine below, has widened the field of surgery in the abdomen; and even when the cause of obstruction is a malignant and non-removable one, life may be prolonged and rendered comfortable by a palliative operation. To secure these benefits for our patients, operations must be undertaken early, before the health is undermined, or textural change of an irreparable character have ensued. By early laparotomy, strangulation by bands, and diverticula, can be dealt with successfully. Circular enterorrhaphy is still practised by German surgeons. I had the opportunity of seeing Professor Koenig, of Göttingen, remove several inches of the intestine, consisting of part of the ileum and cæcum, for tuberculous stenosis

of the ileo-caecal valves. During operations on the intestines, great difficulty is frequently experienced in distinguishing the ascending from the descending portion of the bowel, and in this connection it has been suggested that Nothnagel's test may be applied. He found, by experiments on animals, that when the serous surface is touched with a crystal of common salt, ascending peristalsis is produced. Whether the parietic condition of the bowel, which is present in many cases of obstruction in the human subject, would prevent the action of this test, must be decided by future experience, much doubt having been expressed by competent observers as to its value.

Professor Senn has also brought forward the rectal insufflation of hydrogen gas as a test in the diagnosis of visceral injuries of the gastro-intestinal canal, in penetrating wounds, and in gunshot wounds of the abdomen. The abdominal distension which ensues, if a perforation is present, obscures the liver dulness; whilst, if no perforation is present, the liver dulness rises, and sometimes gas may be forced out of the wound and lighted. As soon as one perforation is closed, hydrogen gas may be used to find out if there are others; if the wound of entrance through the skin is not sufficiently patent, it must be dilated by suitable forceps, which are left in till the experiment is over. In one successful case twelve perforations of the intestine were sutured, the patient recovering.

The work of Senn, on the "Surgery of the Intestines," is destined to rank high amongst the remarkable developments of surgery during the last decade. On the 2nd of February, 1891, I had an opportunity, at the Adelaide Hospital, to operate on a woman, aged 28, who was suffering from a homicidal gunshot wound of the abdomen. Her husband had fired four shots at her—the first struck her in the hip; the second was fired from behind, and struck her on the left side of the chest, low down; the third grazed the scalp in the occipital region; the fourth shot missed her, but the child she carried on the left arm was found to be shot through both hips, the bullet, in passing through, grazing the perineum. About four and a half inches above the umbilicus a bluish swelling had formed, and through the skin a bullet could be felt. The swelling was incised, the bullet extracted, and then the aperture of exit from the abdominal cavity was discovered. By an oblique incision, starting from the vertical wound, the stomach was exposed and drawn out, and the aperture of exit from the stomach was found on the anterior wall, three inches from the mesenteric border. The edges were pared and sutured, and by gently separating, a little opening was made in the omentum, and the aperture of entry into the stomach discovered. This was also pared and sutured. On incising the aperture of entry in the chest wall, the tenth and eleventh ribs were found to be shattered, but the spleen, being smaller than usual, was uninjured. Irrigation was adopted, and masses of clots removed. The patient died of shock in fifteen hours. At the autopsy, commencing peritonitis was found; no clots in the abdominal cavity; about eight ounces of serum in Douglas' pouch. The stomach was filled, and found to be perfectly watertight.

A remarkable case of punctured wound came under my care several years ago, and serves well to illustrate the successful treatment of these injuries, even under unfavourable circumstances. I was called to see a young married woman, who had been stabbed in the abdomen by an Italian with a butcher's knife, the blade of which was two inches wide. On raising her garments, which were horribly dirty, I found more than three feet of the small intestine hanging out. I made her support the intestine with her hands, applied outside of her clothes, and took her to the Adelaide Hospital, a distance of

two miles, in a cab. Ether was administered, the wound enlarged, and the intestines, after most careful cleansing, returned, and the raggedly-torn peritoneum carefully sutured. She made an excellent recovery.

Surgical intervention in the diseases of the gall-bladder and biliary ducts has now passed entirely beyond the experimental stage. Petit, in 1743, was the first surgeon to suggest the opening of the gall-bladder when adherent to the abdominal walls, to remove calculi; and Morand, in 1756, was the first to practise the operation. Courvoisier was the first surgeon to suggest deliberately opening the non-adherent gall-bladder, to remove calculi; Marion Sims performed the first operation of this kind, whilst Kocher (of Berne) followed with a successful result. The tendency now is to practise cholecystotomy, with suture of the cut edges to the parietes. Suturing of the gall-bladder, and replacing it in the peritoneal cavity, cannot yet be recommended. It is far preferable, in cases in which the gall-bladder cannot be sewn to the parietes, to convert the operation into a chole-cystectomy, which was first practised by Langenbuch (of Berlin) in 1882. Chole-cystectomy is rarely indicated, but may be performed in cases of dropsy of the gall-bladder, with obliteration of the cystic duct, or when, in an attempt to remove calculi, there has been partial destruction of the walls. Tumours of the gall-bladder and biliary fistula, with obstruction of the cystic canal, may be treated in the same way. The work of Thornton proves that chole-dochotomy, for the removal of an impacted calculus, may be practised with success, when chole-docholithotripsy, or needling, as suggested by Lawson Tait, is unsuccessful. Chole-cystentorostomy was the suggestion of Nussbaum, of Munich, and was first performed by Winiwarter of Liège, Socin of Bâle, Mayo Robson in England, and Terrier in France. It should only be performed for persistent biliary fistula, due to occlusion of the common duct by some non-malignant process, and should never be done for impacted calculus. The duodenum or jejunum should always be selected in preference to the large intestine, so as to imitate the natural processes. In Australia we have, so far as I know, had occasion only to adopt chole-cystotomy, and it was my good fortune to perform the first operation in Adelaide, removing a stone weighing 114 grains from the gall-bladder; the patient recovered perfectly, the fistula gradually closing. Since then the operation has been successfully performed on many occasions. Two observations of my own point to the importance of allowing the forces of nature full play before operating, and although they tell against myself, I think they may encourage others to remember that sometimes, though rarely in surgery, "they also serve, who only stand and wait":—

Mrs. D. was operated upon by me on the 18th September, 1888, for gall-stones. There was no fluid in the bladder, which, on exposure, was felt to be as hard as a stone, and on laying it freely open the stones were found to be each in a loculus, from which they had to be elevated with a director; fifteen in all were removed. A rapid recovery ensued from the operation, but after a couple of months her sufferings began again worse than ever. These were borne with stoicism till March, 1889, when I was called to see her again. She was deeply jaundiced, and writhing in agony. On my recommendation, she was removed from her home in the country to a private hospital, and I determined to make another attempt to rid her of her enemy. On the morning of the operation she was free from pain, and said she believed that she had passed the stone, but, as she had often been deceived in this way, her husband begged me not to postpone interference any longer. I cut down through the old incision, and found the greater part of the bladder converted into an adherent fibrous mass. On the way to the gall-

bladder I found a gall-stone the size of a hazel-nut, which was evidently working its passage to the surface; and, as nothing could be felt in the common duct, I stitched the remains of the gall-bladder to the parietes, and closed the remainder of the abdominal wound. In the first motion, a large gall-stone was found, showing that on this occasion her belief had been correct. Again, I operated on a woman on the 26th November, 1890, who had a history of attacks of pain, and was jaundiced. I found no stones, but three large ones passed with the first motion. In all, I have had ten cases without a death, and the largest number of stones removed at one time was thirty-three.

Active surgical intervention in the treatment of appendicitis, accompanied by the formation of pus, is now everywhere acknowledged to be correct. The loss of a valuable life several years ago, through an abscess perforating into the general cavity of the abdomen, has induced me to range myself with those who operate early. To Treves, of London, McBurney, of New York, and other American surgeons, we are indebted for the greater part of our knowledge of the subject. That the frequency of appendicitis has not been over-rated is proved by the fact that Matterstock, in making 146 *post-mortems* on abscesses in the right iliac fossa, found that the origin of the suppuration was perforation of the vermiform appendix in 136 of these cases. When a local peritonitis is set up with the formation of adhesions and abscess, it suffices to open and drain thoroughly. When perforation of the appendix leads to general peritonitis, immediate laparotomy is indicated. The appendix must be ligatured and removed, the cut edges being united by Lembert's sutures. In relapsing appendicitis, the operative measures should be timed to take place during an interval. The cure of tubercular peritonitis, with copious fluid effusion, has been accomplished in quite a considerable number of instances by incision and drainage. Koenig has collected 131 well-observed cases, which include 14 of his own; 24 were lost sight of, leaving 107—of whom 84, or 75 per cent., were cured. Leaving out of consideration all those who were observed for a shorter period than two years, his statistics still show 25 per cent. of recoveries. The mortality of the operation was under 3 per cent. In several cases a piece of the peritoneum was excised, and the bacillus of Koch demonstrated. How is this cure brought about? We must say that no satisfactory explanation has yet been given, but Koenig suggests that there may be here, as in other parts, an evolution of fibrous tissue, with cicatricial contraction, which kills the tubercle bacilli. The action would then be very similar to that which takes place in the use of Lannelongue's *méthode sclérogène*. In this a 10 per cent. solution of chloride of zinc is injected outside of local tuberculous foci, to stimulate the formation of fibrous tissue, and by compression, to starve the bacilli, and cause their death. The results which I have seen of Lannelongue's method have impressed me so favourably that I intend to give it a fair trial at the Hospital for Sick Children in Melbourne.

In septic peritonitis, occurring after operations, re-opening and washing out has been attended with success. Let me recommend to you an addition to this plan, which I have tried on one occasion with a successful result. It is nothing more than systematic washing out of the stomach with a mild antiseptic lotion, such as salt solution, or weak boric acid, to obviate the necessity of vomiting, with consequent exhaustion, and to enable small quantities of concentrated food to be placed in the stomach. The change from the pallid hue of death to the normal hue of health, caused by this process, will convince even the most sceptical of its use in these cases. The ability to take nourishment will sometimes turn the scale, and did so most

probably in the following case:—The patient was sent to me in February, 1891, having been frequently tapped for an ovarian cyst. After opening the peritoneal cavity, the cyst was found to be so thin that, in separating the almost universal adhesions, my fingers perforated its walls, and I had to remove the colloid contents by passing my whole hand into the cyst. Adhesions to the intestines, the omentum, and the uterus were then dealt with. The abdominal cavity was thoroughly cleansed by prolonged douching. A glass drainage tube was inserted, but in forty-eight hours well-marked symptoms of septic peritonitis developed, and at a later period pyæmic abscesses formed. In spite of this, she made a perfect recovery, and I am inclined to think it was *propter hoc* and not *post hoc*—the phagocytes having been aided in their struggle against the microbes by the power of the patient to take nourishment.

Renal surgery has now advanced to the dignity of a well-established position. My first operation for nephrotomy was performed in 1883. In 1884 I performed nephrorraphy and nephrectomy, and in 1887 neprolithotomy. I have now performed twenty-five operations on the kidney with two deaths, and in all the great centres of surgical work in Australia these operations are permanently established. There is, however, much work to be done in settling the disputed question of the best route to the kidney—whether the abdominal or lumbar. For my own part, I think that the abdominal, or trans-peritoneal, operation of Terrier should be reserved for the removal of large tumours, or for cases in which for some reason the other kidney has to be examined at the same time. Mr. Morris has shown that in hydro-nephrosis, if tapping is not successful, nephrectomy should take the place of nephrotomy, on account of the objectionable formation of urinary fistula, with its attendant discomforts. Evidence is also accumulating, that nephrectomy should be substituted for nephrotomy, in suppurating kidney, as the latter operation renders the former more difficult of execution. Rupture of the kidney has been treated successfully by nephrotomy, or nephrectomy, or by excision of the crushed part if of small extent.

The treatment of hydatid disease has, I am happy to say, since the discussion at the Melbourne Congress, become more radical, and from all parts of Australia records are coming in of successful operations. When I was in London I had the pleasure of seeing Mr. Treves perform a radical operation on a hydatid of the liver. In Paris also, I saw Pean operate on a cyst of the liver. He operated in the same way as we do here, removing the contents at the time. The literature of the subject has been enriched by the publication, by Dr. Graham of this city, of a beautiful volume containing an excellent account of the disease, teeming with practical knowledge and sound advice, and illustrated in a perfect manner. In it, he shows a rare appreciation of the work of Bird, Thomas, and others who have contributed to our present knowledge of the subject. The experiments of Professor Lebedeff and Dr. Andreef (of St. Petersburg) have proved that daughter-cysts, when placed in a rabbit's abdominal cavity, will continue to grow and multiply. This fact, which admits of no reasonable doubt, suggests the absolute necessity of avoiding the entrance of any of the contents of a cyst into the abdominal cavity; and for the same reason, Lindemann's operation should not be used, if it be possible to unite the peritoneum to the cyst first, without penetration of the latter. A clear space is then left in which the trocar is used, to empty the cyst as completely as possible. It must then be opened by an incision, and the edges attached to the abdominal wall in the usual way. If a cyst ruptures into the abdomen suddenly, it is probable that peritonitis and death would follow if the surgeon does not perform laparotomy.

On the other hand, slow leakage might lead to the growth and multiplication in the abdominal cavity, and this may be one of the ways in which those cases of innumerable peritoneal, omental, and mesenteric cysts form, as well as by exogenous growth from the parent. When a cyst of the liver ruptures into the abdominal cavity, if the patient survives the shock, adhesions of the intestines may occur, forming a floor to a general abscess cavity, in which the daughter-cysts float free. This occurred in a case which came under my care in the Adelaide Hospital, in March, 1890, and as there are several interesting features connected with it, I shall venture to tax your patience by narrating them as shortly as possible:—Mrs. O'S. was admitted to Hospital on 30th March, with a general fluctuating swelling of the abdomen, and in the right hypochondriac region was felt a swelling, perfectly smooth and rounded, reaching down to the level of a line drawn horizontally through the umbilicus. There could also be felt a smooth and soft tumour in the lower part of the abdomen. Per vaginam the foetal head could be felt through the anterior wall, and so pregnancy was undoubted. An aspirating needle was passed into the collection between the pregnant uterus and the tumour; no fluid flowed, but in moving the needle about in the cavity it snapped, owing to a flaw. Under ether an incision was made through the muscles, down to the peritoneum, to try and remove the needle, but as it had fallen into the cavity, which I did not want to open before carefully considering the case, I contented myself with passing through the wound a larger needle, and drew off sixty-six ounces of sage-green coloured fluid, specific gravity 1024, containing albumen, chlorides, but no urea or bile, and no hooklets. After the tapping, the upper tumour could be made to move forward and backwards by bi-manual palpation. An aspirating needle was passed in, and a few drops of clear fluid, with yellowish flakes, were drawn off, which under the microscope showed hooklets and cholesterine crystals. Whilst the patient was recovering from the anæsthetic, I detected alternating hardness and softness of the lower tumour, due to undoubted uterine contractions, which occurred about every two minutes. Two days later she miscarried. On 9th April, I cut down on the upper tumour from the loin, but the colon presented, the kidney being pushed over to the spine. An aspirating needle was passed into the kidney, but as no fluid was obtained, the lumbar incision was closed. A vertical incision, about three inches long, was made to the right of the umbilicus. The peritoneum was much thickened, and on opening into the cavity, several pints of puriform fluid and daughter-cysts escaped. The portion of the needle, lost on 30th March, was found and removed. Washing out removed much lymph and many cysts. On examining after evacuation, I was able to pass my finger into the rent in a cyst of the liver, whose walls were undergoing calcareous degeneration, and many bile-stained daughter-cysts were removed. Drainage tubes were used for the peritoneal cavity, and for the liver cyst, and the patient made a rather prolonged convalescence, but eventually made a complete recovery. Mr. Bond, of Leicester, has successfully closed up a hydatid cyst immediately after fixing it to the abdominal walls and removing the contents. It seems probably that we shall be able to treat almost all the non-suppurating cases in this way, for, if the method suffices for a chronic abscess, it is much more likely to be successful in a hydatid cyst, which possibly we may be able to examine carefully with an electric endoscope before closing.

In connection with the subject of parasitic disease, very considerable additions to our knowledge have taken place in regard to actino-mycosis hominis, which has been successfully cultivated by Israel and Wolff, of Berlin, outside of the animal organism. Injections of a pure cultivation into a rabbit

have been proved to produce the disease. Although it is well known that the disease is very common in cattle, it is not well known that its frequency in man has been much under-rated. The affection has been proved to be the same in man and cattle, and under the microscope the characteristic clubs and mycelia may be made out. Many cases are now on record of successful radical operation for this disease, which has been seen in the lungs, liver, brain, tongue, and in connection with the jaws. In the lung, it simulates empyema and pulmonary cancer, and is known by the appearance of yellow semi-solid matter, like sago grains.

Many cases of hepatic and thoracic disease, previously unaccounted for, may now be explained by the presence of the ray fungus. Professor Crookshank has suggested that the characteristic "clubs" are probably the organs of fructification of the fungus. A direct case of contagion from cattle to man is reported, which occurred in the tongue of a veterinary inspector, who in turning over papers referring to consignments of cattle had been in the habit of moistening his fingers, to facilitate the proceeding. A swelling of the tongue formed, which was incised, and the pus found to contain microscopical evidence of the fungus. The abscess was then carefully scraped out with a sharp spoon, and the patient recovered. Dr. Matalakowski, of Warsaw, reports another successful case:—A farmer, *æt.* 46, had a tumour under the jaw, and his teeth had been dropping out for years, without caries. Fistulæ formed, and a discharge like boiled sago grains, and blood, came out, which, on examination, showed the fungus. The tumour, sub-maxillary glands, lower part of the parotid, and parts of several muscles were removed, and the cavity healed by granulation. The patient was well two and a half years after.

Cases occur very frequently in Vienna, and Professor Albert, of that city, states that forty-three cases of the disease were treated at his Clinique in four years. The probability of the occurrence of the disease in cattle in Australia must be borne in mind, and the possibility of the disease being produced in man, by direct contagion, realised.

Objections have been made to many of the procedures to which I have referred to-day, simply because they are new, and this raises the question of the existence of true and false conservatism in surgery. No one who has studied the development of surgery since ovariectomy was first attempted in London can fail to have been struck by the existence of a false conservatism, which has never failed to find suitable exponents from that time down to the present. This false conservatism has shown itself in a remarkable tendency to oppose every attempted advance in our art simply because it was new, and because in the development of the advance the mortality may have been high. The supporters of this policy have not been content with stating their objections in a scientific manner, but have descended in many cases to virulent opposition, the details of which have too frequently disfigured the medical literature of recent times. Luckily for the present state of our art, there have always appeared progressionists, with the inspiration of genius, who have compelled the objectors to adopt the very methods which they before attacked. Ovariectomy would have sunk into oblivion had it not been for the labours of Sir Spencer Wells. Removal of diseased uterine appendages, the ablation of normal ovaries and tubes to cure fibroids by the production of an artificial menopause, would most probably have been prohibited had it not been for the genius of Lawson Tait. Similarly, his operation for ectopic gestation, which had ruptured intra-peritoneally, was condemned, and would have had to pass through a more fiery ordeal of criticism had it not been supported by thirty-seven cases performed with only two deaths.

Abdominal hysterectomy would not have overcome the prejudices of surgeons if Keith's marvellous success in this operation had not been published. That he has now turned to electrical treatment matters nothing for the purpose of this argument. No one knows when the brilliant work of Blundell in kolpo-hysterectomy would have borne fruit had it not been for the labours of the German surgeons, who have reduced the mortality of this operation from over 50 to 5 per cent., at which it stands to-day in Germany. The present position of renal surgery would not have been attained if Mr. Morris had not forced it into prominence by his bold operations and able writings. In the case of Horsley's and Macewen's work on the brain and spinal cord, opposition was to a large extent disarmed by their excellent results. Pylor-ectomy has become an allowable procedure, owing to the genius of Billroth; while to Hahn, of Berlin, is due the recognition of extirpation of the larynx as a legitimate operation in appropriate cases.

That there should be men who subject all our advancing work to careful and sceptical observation and to judicial consideration, augurs well for the progress of our art, but it is not this right and proper conservatism that I wish to condemn. Let us hope, then, that with the dawn of the twentieth century, almost at hand, we may be able to "ring out the false and ring in the true." Perhaps here we are nearer that consummation than in the older world. For in a new country, such as the one in which it is our good fortune to live, we have the advantage of being untrammelled by tradition; and so far our modest work has been free from, and untainted by, virulent personal discussions, calculated to disturb that scientific calm which is so essential to real progress.

In conclusion, let me express my regret that I have been able to consider only a small portion of our work. Nathaniel Hawthorne says:—"It is the iron rule in our day to require an object and a purpose in life. It makes us part of a complicated scheme of progress, and insists on everybody adding somewhat—a mite, perhaps, but earned by incessant effort, to an accumulated pile of usefulness." In what I have said I have endeavoured to add my mite, and I hope that, by your contributions to the work of this Section, you will each add somewhat, and thus lessen the great space which has been left unfilled.

Disinfection in Surgical Practice.

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THE records of hospital practice twenty years ago tell us in the most emphatic language of the inestimable advantages that the modern surgeon possesses in treating wounds, especially simple wounds, in the light of recent scientific knowledge. Not only have our ideas of the nature of certain diseases occurring in surgical practice been completely revolutionised by the study of bacteria and their habits of life, but even the practical details, about which especially I wish to speak, are the direct outcome of the method of precision introduced and practised by the students of bacteriology. We recognise now, not only that the process of healing should take place without any serious reaction, but further that any inflammation or septic fever following simple wounds is not the natural reaction of injured tissue, but an abnormal state created by some definite foreign element introduced into the body from the outside. Simple fever may, of course, follow any severe injury of tissue, whether by operation or accident, and is, no doubt, due to the production and absorption of the Fibrin ferment. This absorption is *toto cælo* different to septic fever. It sets in immediately after the operation or injury reaches its acme, and then falls. Septic fever, on the other hand, is caused by organisms that need an incubation period for elaborating their poison, and the fever does not set in sooner than the fatal second or third day.

In former days, in the state of ignorance that existed with regard to the true cause of inflammation, it was but natural that the surgeon relegated the accidents and complications that dogged his treatment on every side to vague and visionary causes. Indeed, then, mainly the surgeon was judged by his dexterity at the side of the operating table. If complications supervened, it was no fault of the surgeon; fate or chance was held responsible for the untoward events.

In every hospital and on the battle field, hospital gangrene, purulent œdema, erysipelas, and suppuration followed in the wake of every surgeon. Hospital gangrene sometimes attacked 50 per cent. or more of surgical wounds; erysipelas was of daily occurrence, and sometimes occurred in serious epidemics; union by first intention was scarcely known; for fear of erysipelas it was thought unwise to stitch scalp wounds; more than 50 per cent. of the cases of amputations died, and in compound fractures, more often than not, the wound was attacked by erysipelas or gangrene, or death followed general septicæmia. Compared with these results what is the experience of to-day? Hospital gangrene is no longer known in hospital wards; erysipelas is rare; and wounds in the hands of surgeons, who base their practice upon the teachings of modern science, rarely, if ever, fail to unite by first intention and without suppuration. What a saving of distress and pain to the patient! Why, only ten years ago many a surgeon was satisfied if, after amputation of the breast, the wound granulated up in three or four, or six months; even the larger amputations needed four or six months to heal. Now-a-days the surgeon has good reason to be disappointed if after amputation of the breast with clearing out of the axillary glands, the patient remains more than a fortnight in hospital, and instead of the distressing

daily dressings, the dressings are left untouched for a week, and in another week the patient is well. By these modern methods, deduced from the scientific investigations of the bacteriologist, something more is saved than the suffering of the patient. Instead of hospitals having to maintain patients for three or four months, a fortnight is often all the time that is needed, and stimulants are no longer so much required to keep up the strength of the patient, more or less exhausted by sapræmia or septicæmia.

Disinfection paved the way for the marvellous progress of modern surgery. It was not till the nature and origin of infection was studied, and after much patient and often thankless labour discovered in its real essence that the surgeon was justified in extending the domain of his operative skill. Till recently abdominal surgery was held to be eminently dangerous, and deep operations on the brain almost unknown. Now-a-days no organ or part is beyond the reach of the surgeon. The first pioneer in the unexplored country of wound infection was Lister. Fully cognisant of the epoch-making discoveries of Pasteur, Lister perceived the similarity between the processes of putrefaction and fermentation and the irregular disturbances that occurred in the process of healing in wounds, and concluded that these disturbances in wounds were likewise due to the action of living organisms abounding in the air. Be it remembered that Lister began his work long before we had any means of discovering or demonstrating the existence of pathogenic organisms. The contact with air was presumed to be the source of infection, and Lister's aim was to prevent such contact. His first ideas and methods were only tentative, and in 1868 he himself wrote, "as the treatment has been gradually improved, the earlier cases are not to be taken as patterns." It is necessary to read the records of his early cases to realise to the full how each case had its lesson for the keen observer, and improved methods followed upon the earlier cases. Just at this time Mr. Calvert, of Manchester, had directed attention to the extraordinary power of carbolic acid in arresting putrefaction and fermentation, and Lister thought to test its power in compound fractures. He drenched the explored tissues in several cases of compound fractures with pure undiluted carbolic acid. This had the effect of forming a firm hard crust that completely protected the wound, and the wound healed beneath the crust in a manner that was truly astonishing. Not only in compound fractures, but in abscesses and other conditions, this use of carbolic acid gave results that far exceeded all anticipations. This was the beginning of Lister's work. Time forbids me to trace the result of his work through the quarter of a century after his first observations.

In this interval of time we have surely learnt that not only the well recognised form of infectious diseases are caused by specific germs, but the most important disturbances, that have hitherto so frequently complicated the process of healing, are of similar origin. In the specific fevers the infectious agent probably finds entrance to the body by uninjured mucous membranes—the infections that come under the notice of the surgeon enter by wounds and injured surfaces. These infections are suppuration, erysipelas sometimes euphoniouly called erythema, that hitherto mysterious complication of injuries, tetanus, and the still severer conditions of purulent œdema, malignant œdema, and hospital gangrene. To these may be added gonorrhœa, soft chancre, and syphilis. In the case of soft chancre and syphilis the specific agent is not definitely settled, while, thanks to antiseptic surgery, hospital gangrene has not appeared in hospitals to give bacteriologists an opportunity of discovering its nature and cause. It is mainly necessary for

the surgeon to aim at preventing suppuration or erysipelas or even tetanus ever complicating the healing of a simple wound. Further, even when a wound is infected with the organisms of suppuration, it is still important to prevent erysipelas occurring as a further complication. Just as in typhoid fever, diphtheria, pneumonia, and probably syphilis, the malignant types seem to be due to a mixed infection, malignant types of traumatic infections are probably also of a similar nature.

One of the first essentials in the qualifications of a modern scientific surgeon is a clear understanding of the nature of the infections and the best means of excluding the infectious agents from wounds. I do not propose to enter into any description of the specific organisms. I shall rather attempt to give a general outline of the methods that are adopted to prevent these organisms finding their way to wounds. The best methods have been evolved from a careful scientific investigation of the life-history of the organisms themselves, and it is no wonder that most of our recent knowledge concerning the methods of disinfection come from the scientific institutions of Berlin and the schools associated with them. The aim of the surgeon should be to disinfect so thoroughly as to keep at a distance all the organisms known to disturb the process of healing. Strictly speaking, a disinfectant is an agent that kills bacteria in their vegetative and resistant form. The spore is the most resistant form, and some spores will survive even boiling for a couple of hours. At one time the criterion of disinfection was the destruction of the smell of putrefying matter. It was not till Koch selected the resistant spore of anthrax as the standard, according to which disinfections should be judged, that we came to have some knowledge of the relative value of various chemical compounds as disinfectants. Numerous and careful investigations on this basis have compelled us to discard many bodies hitherto trusted, and introduced to us others, till then unknown. Lister introduced carbolic acid into surgical practice, Koch has given to us corrosive sublimate as the most powerful of all disinfectants. Koch found that a 1:300,000 solution of corrosive sublimate effectually arrested the growth of anthrax bacilli and a 1:20,000 solution killed them in ten minutes. Corrosive sublimate and carbolic acid are the disinfectants in almost universal use, but each has its disadvantages, and neither can be used under all circumstances. Thus, sublimate may be readily decomposed by certain chemical combinations, especially in the presence of certain sulphides, and its action thus paralysed. This, therefore, is of very little use as a disinfectant of excreta or sputa. Carbolic acid is far better, especially in the case of choleraic discharges. It is a familiar fact to all students of bacteriology that the cholera vibrio is extremely sensitive to the action of acids; it will not grow in a slightly acid medium, and even such a weak acid as that of the stomach soon kills it. Then the experiments of Koch show that, though a watery solution of carbolic acid is a powerful disinfectant, carbolic acid dissolved in oil or alcohol in the greater strength of 10 per cent. has not the least effect on anthrax bacilli. This is surely of importance when we bear in mind what implicit faith was placed in carbolic oil a few years ago—in surgery and especially midwifery. Hereto may be ascribed many unexplained and unexpected cases of infection of wounds and many a case of puerperal sepsis. Now-a-days, all oily preparations should be discarded as untrustworthy, and this is especially to be remembered in midwifery practice. Oily substances form an envelope around the organisms, and prevent the disinfectant reaching them. In a similar way organisms that infest the skin are protected, sometimes by layers of epithelium or fatty elements, or dirt, or secretions, or exudations, or even blood, so that the mere washing of the hands with antiseptic lotions in no way guarantees

freedom from organisms. The organisms are buried in and protected by these materials, and are not at once exposed to the action of the disinfectants. Even such an authority as Watson Cheyne, in 1882, looked upon the washing of the hands with soap and water as a superfluous luxury. But now-a-days we do not trust solely to these chemical substances for purposes of disinfection. Under the conditions in which the specific organisms of wound infections live and thrive, it may be next to impossible to at once bring the disinfectant into direct contact with them, and, at least in disinfecting the skin, these chemical substances are not the most important means. In the skin the organisms are embedded in layers of dirt and dead epithelium, or mixed with the fatty or other secretions of the skin; and, accordingly, mechanical measures, as by brushes, combined with the free use of soap, are of still greater importance, and by some good authorities are help to be all-sufficient. Nevertheless, when the skin is quite clean and smooth, carbolic acid (1 in 20) or corrosive sublimate (1 in 1,000) is of undoubted value, though if strong enough to destroy the organisms it sooner or later irritates and discolours the skin and nails of the operator.

From a surgical point of view, washing the hands is undoubtedly one of the fine arts. It is now quite certain that the most constant source of infection was, and still is, not the surrounding air, but the hands of the surgeon, or dresser, or nurse, or the skin of the patient. In an endless number of ways the skin comes to harbour all kinds of organisms. They penetrate the superficial layers of epithelium, and abound especially in hairy parts and in all folds and pockets of skin. The skin furnishes the organisms with all the conditions they require for life and sustenance. The temperature is eminently suitable; there is moisture, and plenty of food is to be found in the fatty and albuminous matters discharged or excreted. The surgeon now recognises, as bacteriological examinations have proved, that a specially suitable resting place for the organisms is beneath the nails and in the folds immediately around them. There they lie in wait to infect if they get the chance. How are these agents of infection to be dislodged, and the hands of the operator and attendants, and the skin of the patient, to be rendered sterile? The literature upon the best way of washing the hands and skin is already very extensive, and various methods are in use. In everything that is done to ensure disinfection it is recognised that, while half measures may have a certain measure of success, there is a certainty in thorough and complete measures that leaves nothing to be desired and leaves no room for after-regrets. Whatever is worth doing is worth doing thoroughly. I do not doubt that some of you fully recognise the importance of extreme care and trouble. It is for others, and especially those who have not been in the ways of learning for themselves the practical methods of disinfection, that I have taken upon myself to give a short account of the more recent methods in use in the great German and English hospitals by which the great enemies of the simple healing of wounds are met and successfully resisted at the very threshold. Many a student leaves the hospital without acquainting himself with the methods of disinfection carried out by the hospital assistants, who do such good work in preparing the instruments, &c., for the operations. It would be a wise economy if every hospital had a properly fitted apartment for the carrying out of thorough disinfection, and even bacteriological laboratories, such as they have in German and most English hospitals, where scientific work could be done, and then perhaps those who pooh pooh these modern methods, would come to have a little more respect for the deadly enemies of the normal process of healing. The practical details are the bulwarks of the system, and if these details are

religiously carried out I would almost defy anyone to have erysipelas or erythema, or septic fever or suppuration, or, still worse, general septicemia, whether toxic or infectious, coming in unbidden to give him untold trouble and anxiety, and his patient, it may be, a prolonged illness, it may be a miserable death. The simplest way of disinfecting the hands and nails is to wash them thoroughly in hot water with a clean nail-brush and plenty of soap. It is well to boil one's nail-brush if one has been using it recently, especially after septic cases, and keep it in a sublimate (1 in 1,000) solution. It is also as well to know that some soaps contain germs—those soaps that are manufactured by the cold process. Carbolic soap is very good. After washing the hands for five to ten minutes they may be dipped in corrosive sublimate (1 in 1,000, or even 1 in 500). Some make it a practice of taking off the soap with carbolic acid before immersing the hands in the sublimate, for the soap tends to decompose the sublimate and render it inert. The most recent method in vogue in the Berlin Hospital and elsewhere is based upon Fürbringer's bacteriological investigations. Alcohol or ether is used to dissolve the fatty elements in the skin. The hands or skin are energetically scrubbed with a nail-brush in soap and water as hot as can be borne for some minutes, and at all times the nails should be well cleaned. They are then carefully dried and rubbed with sterile towels or gauze. Next the skin is rubbed with alcohol (80 per cent.) or ether by means of sterile gauze for one or two minutes, and, lastly, the hands are washed and rubbed with sublimate solution (1 in 2,000 or 1,000 if it can be borne). Ether is especially valuable if there is much gross dirt, and special care is necessary if the surgeon has been touching infected wounds. The same treatment is applied to the skin of the patient around the seat of operation, and, of course, any hair is shaved away. Either method is easily practised, but let me add that, after washing one's hands thoroughly, it is none the less necessary to keep them clean and aseptic. How often does one see an operator go through the performance of washing his hands with scrupulous care, and soon after, while he is waiting for the patient or something else, he strokes his beard or passes his hand through his hair, or mauls the blankets covering the operation table, or puts his hands in his pockets, or picks his teeth, or does one of the hundred and one things that may in a moment undo all the good he has gained and again render his hands septic. Whatever the surgeon wishes to touch, and must touch, should be rendered sterile, and the surgeon should touch nothing that has not been rendered sterile.

It is much less easy to deal with mucous membranes. In operations on the uterine cavity, vagina, or rectum, thorough disinfection is difficult, if not impossible, but fortunately septic organisms are not of common occurrence in the female genital passages. The severe scrubbing of the vagina that Hofmeier recommends, is of doubtful advantage and may do harm, nor can strong disinfectants, such as carbolic acid or corrosive, be freely used. They may lead to poisonous symptoms, but apart from this, severe chemical or mechanical irritation increases and may alter the natural secretions, and thus favour the life and growth of organisms. For the genital passages, experience teaches that the best and most that can be done is to wash the vagina out well with soap and water, rubbing gently, when possible, with the clean finger or sterilised sponge or gauze, while for the uterine cavities, irrigation with plain sterilised water is the best method. Irrigation on this plan should always be done before curetting, and I have never seen the temperature rise after an operation performed under these conditions. In myomectomies it is customary to sear the cervical or uterine cavity, if they have been opened to protect, as far as far as possible, against infection.

I desire now to point out a matter of importance that is generally neglected; I mean the preparation of the operation room. It is the rule to find the room with the doors and windows open even during the operation. Now it is certain, as we know from our own experience in a bacteriological laboratory, that currents of air, such as are caused by open doors and windows, are frequent causes of contamination in cultures. Such draughts of air in the operating room carry about particles of dust which may be loaded with septic organisms. It is a wise rule to spray the operating room a couple of times before the operation, and then, with closed windows, to allow the solid and liquid elements in the air to settle. This is not without its value. But granted the surgeon is free from infection, and the skin of the patient has been rendered aseptic, and the room ready, we have still to render innocuous the instruments (of all kinds), the ligatures, the sponges or swabs, the sutures, and also the dressings. Let us consider them in this order:—

1. Instruments must be cleaned first and then sterilised. For many years heat has been the chief means of sterilising instruments. Boiling water kills all septic germs in a few minutes, and is always at hand. Unfortunately, boiling water makes instruments rust and takes the edge off sharp knives. It has been known for a long time that soda prevents knives and instruments rusting, but it was not known until Behring (one of Koch's assistants) proved it, that soda also possessed peculiarly valuable properties as a disinfectant. In a 1 per cent. boiling soda solution Behring has given to us the ideal sterilising agent. This soda solution not only prevents rust forming on steel knives and instruments, but sterilises so rapidly that it is merely necessary to dip the knives into a boiling 1 per cent. solution of soda for a few seconds in order to render them perfectly sterile. This method, besides, does not blunt the knives. It is tolerably certain the alkali in some way enables the heat to penetrate the resisting envelope of the organism. At any rate, it is certain that the organisms of suppuration are killed by this boiling solution in a few seconds, and even the resisting spores of anthrax cannot survive longer than two minutes. Washing-soda contains 14 per cent. of soda, and is to be had in every house; so that one of the best agents for sterilising instruments is always ready to hand.

It is best to boil all metal instruments in this solution for about five minutes, while knives, after having been cleaned with alcohol, need only be dipped into this boiling solution for a few seconds. They may then be kept in sterile vessels containing soda and carbolic acid, each in the proportion of 1 in a 100. The introduction of this soda solution into practice further does away with the need of nickelling, since the instruments do not rust in this solution, and will not rust afterwards if they are dried well before they are put away. After use, the instruments should be cleaned in hot soda solution with soap, carefully dried, and rubbed with alcohol, and put away. In consequence of the frequent use of boiling water, instruments and knives are now best made entirely of metal, handles and all. Here are two good specimens of knives—the one introduced by Bergmann, the other by Horsley. (*Exhibits.*)

Sponges are, now-a-days, to a large extent replaced by swabs of sterilised wool that are dipped into strong sublimate (1 in 500), but sponges are sometimes indispensable, especially in abdominal surgery. It is not by any means easy to disinfect sponges without injuring their quality. Boiling them is out of the question; even dry heat needs so much care in drying the sponge first that it has fallen into disuse. Hofmeier recommends that, after removing the lime, &c., by HCl, sponges should be kept in a saturated

solution of sulphurous acid for twenty-four hours, then in carbolic acid (1 in 20) for twenty-four hours; and finally in carbolic acid (1 in 40). In Bergmann's wards, where the soda solution is so much used, the sponges are disinfected by a modified method in this soda solution; they are not put into the boiling solution, but as soon as the solution has boiled and cooled down to about 95° the sponges are put into it for about half an hour. They are then taken out, washed well in water that has been boiled, and finally put into sublimate (1 in 2,000). It is found that sponges saturated with anthrax spores and pus can be thus surely sterilised.

Ligatures and sutures must be thoroughly disinfected. Unless one can be quite sure of one's ligatures and sutures, certain operations should not be attempted. It is self-evident that operations with buried sutures can only be successfully carried out when the materials used are sterilised. Hegar-Simon's operation for repair of old ruptured perineum gives a perfect result, but is not to be undertaken by an operator who does not understand scientific sterilisation; moreover, the intra-peritoneal method of myomectomy is a dangerous operation in the absence of scientific sterilisation, but it is as much the operation of the future as the intra-peritoneal method of ovariectomy was fifteen or twenty years ago. The latest statistics of Zweifel certainly point in this direction. By a special method of stitching the uterus or cervix that involves buried catgut sutures, he has had only two deaths in fifty-one cases—a brilliant record indeed—one death due to pneumouia, and the other occurring four months after the operation from tubercle of the tubes.

The ligatures most frequently used are silk and catgut. Catgut, which by the way is not catgut at all, but part of the sheep's gut, is a material that is gradually absorbed—at least, in a few months; and for this reason was introduced by Lister in antiseptic treatment. Catgut is not very easily sterilised, and many methods are in use. Lister has abandoned his old way of soaking the gut in carbolic oil (1 in 10) since, for reasons already demonstrated by Koch, this method gives no certainty of sterility. His later method of soaking the gut in a 5 per cent. solution of carbolic acid containing chromic acid (1 in 4,000) is much better. The gut is removed from this solution in forty-eight hours, and after being dried is preserved in carbolic oil (1 in 5); but even this method has proved uncertain. A more recent method is that of Kocher. The gut is put in juniper oil for twenty-four hours, then into glycerine for the same length of time, and is then preserved in a glass vessel containing absolute alcohol mixed with a small percentage of juniper oil. This catgut is taken directly from the alcohol for use, and has all the advantages of gut. Von Bergmann has the best method of all. The glass vessels for holding the gut are sterilised. The gut is then rolled on glass plates on cylinders. These rollers of raw catgut are put into the holders, and then ether is poured on to the vessel and allowed to remain for twenty-four hours, in order to remove the fat from the intestinal tissue. The ether is poured off, and the following mixture is then poured upon the gut:—

Corrosive sublimate, 10.

Alcohol, 800.

Aq. distil., 200.

This mixture is renewed in twenty-four hours and again in another twenty-four hours. It is then poured out, and the gut is finally preserved in alcohol without or with glycerine (up to 20 per cent.), according as the gut is wanted

hard or soft. Naturally the vessels must always be kept well corked, else the alcohol evaporates. In this way everyone can easily prepare his own gut, and seeing that the continuous catgut suture is the best method of stitching a lacerated perineum immediately after labour, provided all care is taken to exclude the risk of infection, and the catgut itself is sterile, no practitioner should be at a loss how to sterilise his own catgut. Silk, by reason of its capillary action, allows injurious elements to be absorbed, and this is specially easy in the vagina and perineum after labour. Silk is, of course, very easily sterilised in boiling water, or, better, in the boiling 1 per cent. soda solution. We have still to consider the coverings and dressings of wounds. The irrigation of wounds and open treatment are now only matters of history. These methods had their day and even their use, for the results were better than when dressings of all kinds and conditions were applied, which, if they covered the wounds, were also a constant source of infection; but they passed out of use when proper dressings were introduced. No doubt most of the dressings in use are free enough from septic germs when the packet is opened, but by constant handling, exposure, and contact with numerous objects, it sooner or later becomes contaminated. In 1868 Lister used a crude paste, made of lime and boiled linseed oil, applied directly to the wound and covered by tin plate; but the dressing par excellence is the gauze introduced long ago by Lister himself, and as yet nothing approaching gauze in its fitness as a dressing has been suggested. Gauze absorbs well—can be easily sterilised or made antiseptic. Its absorbing power makes it the best of all materials for plugging gunshot wounds or the uterus, especially in post partum hemorrhages and in other hemorrhages, as in myomata, or in compound fractures, especially if the external wound is small, but even in external wounds, with great destruction of skin, there is nothing better than gauze as a dressing, provided it is sterilised. Gauze is readily sterilised, and the same applies to cotton wool, in Koch's steam steriliser. Here is a metal vessel that is very convenient for this purpose (*Exhibit*). Too much reliance is placed in gauze and cotton wool impregnated with carbolic acid, sublimate, salicylic acid, &c. In course of time the carbolic acid volatilises and the sublimate decomposes. The best gauze is iodoform gauze. Not only is iodoform non-irritating, but it checks in an unmistakable way the decomposition of the secretions of wounds. Till lately gauze was impregnated with iodoform by means of an ethereal solution or a glycerine emulsion. A better way is to sprinkle the iodoform upon the gauze that has been already sterilised. The drainage tube is another part of the dressing that must be sterilised. Tubes that can be absorbed have been used, but are of doubtful use. The common rubber drainage tubes are readily sterilised if they are put into the boiling soda solution for five minutes, or even by steam in half an hour, and may be kept in a 5 per cent. solution of carbolic acid. Glass drainage tubes are sterilised easily enough. The dressings are first changed, in five to eight days.

I have but to add that in many other ways we can save much suffering and do much good by paying more attention to cleanliness and disinfection, notably in catheterisation. The bladder does not normally contain organisms, and frequently organisms are introduced by dirty catheters, and set up very painful and severe cystitis. A little more care in keeping the catheter clean, and in disinfecting the urethra before introducing it, will prevent many such distressing cases. In women glass catheters are all that can be desired—easy to clean and easy to use. In the case of the gum elastic catheters, after they have been washed through with carbolic acid or sublimate solution, simple rubbing with a moist towel, and afterwards with a clean dry one, renders them sterile.

Gentlemen, these methods of disinfection are matters affecting our daily practice, and their value cannot be overrated. To-day we stand on a vantage ground that enables us largely to control and direct the processes of healing in wounds. True too, it will always be the boast of Englishmen that the new era in surgery had its dawn in England; yet, to the discredit of the profession in England be it said, that, while Lister's ideas and methods were eagerly incorporated into the practice of the profession in Germany, where Lister was hailed as no less than a prophet—and he wears the mantle in that country still—in England his work for a long time received but scant consideration. At first his work was ignored; then it was belittled, even ridiculed; to-day Lister holds a place second to none in the whole range of scientific medicine and surgery. He was patient and laborious in his search after better things, and in the midst of much error he was the first to lay hold of the golden thread that, through difficult paths and dark by-ways, at length led him to see, dimly indeed at first and only along a narrow vista the light that now guides us in our daily practice.

Death under Anæsthetics.

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I THINK it must be a fact patent to every one that the deaths during the administration of anæsthetics which have occurred during the past few years, both at home and in this Colony, have so alarmed the public mind that the taking of an anæsthetic is often more dreaded by our patients than the operation itself. I am not at all sure that the fatalities during the administration of anæsthetics are proportionately more frequent of late years, and I have no doubt whatever that, exercise what precautions we may, a certain small percentage of deaths will occur. Still it cannot be denied that nearly every week the home journals record a death from one or other kind of anæsthetic. My object in bringing the subject before you to-day is to discuss the question whether we can, by any means within our reach, lessen the number of these deaths.

On reading the accounts of the deaths under chloroform, as they have appeared during past years in our weekly journals, I was struck with the very great poorness of the record as to the actual condition of the patient previous to the onset of fatal symptoms. For instance, in a great number of cases we hear that the patient "took the anæsthetic well," or that "nothing occurred to cause alarm," &c., and but few records state what was the actual stage of anæsthesia immediately preceding the alarming symptoms, what was the condition of the pupils, whether the conjunctival reflex was present or not, at what rate the anæsthetic had been administered, &c. Now, I take it that one mode by which we may possibly render anæsthetics less fatal is by establishing a recognised system of record so that we may have a clinical standard to refer to; for no matter how fatty a heart may be discovered to be *post-mortem*, or whatever physical cause may be discovered to account for death, what we, as practical physicians, want to know is what the symptoms were which led up to that death, so that, if possible, we may avoid a similar pitfall.

At the annual meeting of the British Medical Association, held at Bournemouth last year, there was an important discussion on anæsthetics, the outcome of which was that a committee was formed to investigate the clinical evidence with regard to anæsthetics and the best method of administering them. This committee subsequently met and drew up a plan of record, which was published in a book form for distribution. A circular was then issued by the honorary secretary to the heads of the various hospitals of the United Kingdom, inviting them to co-operate in this work. The investigation was to begin on 1st January, and is to be continued during the year, and it is now, I presume, going on.

I had felt, long before I saw what had been done in England in this direction, that clinical records of the results of administering various anæsthetics were very much wanted, but as time has gone on I have become convinced that it is the bounden duty of the medical profession to undertake such an investigation. In order that these records may be trusted and taken as standards in the administration of anæsthetics it will be necessary that they should be very numerous and accurate in detail, and I am pretty certain that it will be found impossible to carry this out systematically, and with notes taken at the time of administration, anywhere but in our hospitals,

where assistance can be had in writing. I have always found that my attention was much too fully occupied with my patient while administering an anæsthetic to keep any sort of accurate record, although I have tried several times. Therefore, I say that it is to our hospitals, where there is plenty of assistance, that we must look for carrying out such an investigation. I am quite convinced that the taking of an accurate record of the various symptoms presented by the patient in the various stages of anæsthesia would be a most excellent preliminary training for our students in the administration of anæsthetics, and I, for one, would like to see every student obliged to take an accurate record of, say, twelve to twenty cases before beginning the actual administration of anæsthetics himself. These clinical details would in no way interfere with the safety of the patient, but would, on the contrary be an absolute guarantee that the utmost caution had been exercised in the case.

Such, then, gentlemen, is the object of this paper, viz., that we should endeavour to follow the example which England has set us, and establish our own clinical history of the effect of the administration of anæsthetics. This could only be done in some such way as was done at home, by a committee interested in the subject, who would draw up a system of record, to be distributed to the various hospitals in the shape of books, which should be sent to the secretary for compilation when filled up.

But in order to facilitate matters I have had prepared a plan of record which is, I think, something like what is required, which I now distribute among you for the purpose of discussion. And in order to facilitate this discussion, I propose making some remarks on the items in the plan submitted to you, but in doing so will confine myself chiefly to the demonstration of how each, in my opinion, bears upon the safety of a patient during the administration of anæsthetics.

1. Firstly, with regard to sex. I am unaware of any statistics which show that anæsthetics are more fatal in one sex than in the other, but there can be no doubt that women take anæsthetics much more quietly than men, and that we seldom see that violent spasm and excitement in the female sex which is so common under like conditions with men, and especially muscular men. It is my opinion that, in course of time, our clinical record will show that in the case of females danger to life is more likely to be met with in the later rather than the earlier stages of the administration, and with men in the earlier rather than in the later stages.

2. Age.—We have no facts, as far as I am aware, which would lead us to conclude that anæsthetics are more dangerous at one time of life than another, although it is a common opinion that children take them well and with less dangerous symptoms than the adult.

3. I am unaware that occupation has any influence in the dangers of anæsthetics.

4. To what extent does the nature of the operation influence the danger of anæsthetics? Indirectly very much undoubtedly, for some operations require a much deeper condition of anæsthesia than others. But whether any operation has in itself any influence upon the dangers of anæsthetics is, I think, open to question, except in those cases where there is a direct interference with either the circulation or respiration. In such cases, indeed, the dangers which often arise are not due to the action of the anæsthetic used, but are really the result of the operation, plus the depression of the blood pressure due to the anæsthetic. Practically, of course, it amounts to the same thing, as far as the life of the patient is concerned, but in an analysis of the cause of danger or of death, it is unfair to saddle the anæsthetic with more than its fair share. It is in such cases as these that an accurate record

becomes so useful and comforting to the anæsthetist in showing that immediately preceding some step in the operation his patient was in a position of almost perfect safety.

5. Is one time of the day more favourable to the patient than another, as far as the anæsthetic is concerned? I think we should all be inclined to say that anæsthetics should, if possible, be given in the morning, where does not matter, so long as there is a good light on the face and the patient can be kept warm. The anæsthetist is often put to great inconvenience in the matter of light, but I think it is quite fair for him to insist upon getting sufficient to check the action of the pupils. If he cannot get natural he should use artificial light.

6. What influence has the previous history of a patient upon the dangers of anæsthetics? I suppose that one of the first, and perhaps one of the most important questions, one asks a patient about to take anæsthetics is whether an anæsthetic has been taken previously. I have given anæsthetics to some patients who have taken them so badly, and with such alarming results, that I should be very unwilling to be the administrator a second time. And on the other hand, I have given them to many with a history of trouble in a previous administration, but I do so with the greatest caution and with the greatest respect for my predecessor. I recollect one case in particular, in which an anæsthetic became necessary, where there was a history of previous trouble, and I took the utmost care not to push the anæsthetic beyond what one might regard as the safe stage, and yet the patient became so nearly moribund as to lose her pulse at the wrist, and only one faint sound was to be heard over the heart. In my experience, a previous history of alcoholism enhances the dangers of anæsthetics. As a rule, alcoholics require a great quantity of the anæsthetic to keep them under, and that in itself is a source of danger. I am unaware of any other points in the previous history of a patient which influences the dangers of anæsthetics, but perhaps when we get a record of some thousands of administrations, as I hope we shall do some day, we may get some fresh information in this direction.

7. Anæsthetic and method.—With regard to the anæsthetic used, there is no doubt, of course, that chloroform was the anæsthetic administered in a large majority of the deaths which have occurred; and on the other hand, there are practitioners who have administered chloroform as an anæsthetic for many hundreds, and some for thousands of times, without any fatal result. Who, then, can say that these men are not justified in sticking to their favourite anæsthetic? No one, I take it. But because some portion of our medical brethren have been favoured with these results, are we justified in recommending chloroform as a general anæsthetic? I think not, in face of deaths which have occurred. On the other hand, are we justified in blaming a man if he use chloroform as an anæsthetic, when he might have used some other agent? I do not think we are. But when we possess some thousands of clinical records of administrations, and we can show conclusively that one anæsthetic, or one particular combination of anæsthetics, does not cause so many dangerous symptoms as another, then, and only then, I take it, shall we be justified in saying that this or that drug is the best to be used for any particular case. As regards the dangers of anæsthetics in general, we have no precise record. All we know at the present time is that so many deaths occurred during so many administrations, but we have no information as to how many of the patients who did not die developed dangerous symptoms, and it is in this direction that the value of accurate clinical records will come in. So again with the method of administration of our various drugs as anæsthetics; we have no standard method for any one

of them. One man gives chloroform by the open method—by a piece of lint under a towel; another gives it by Clover's apparatus; another gives ether in a leather boot; whilst another gives it by Clover's apparatus, and we have no real ground, other than our personal experience, for saying that one method is better than another. Surely it is our duty, by a careful comparison and analysis of clinical reports, to be at least in the position to say that in so many thousand cases it was found that such and such was the safest method of administration. Should we not, then, be able to say to our students this is the safest method of administration—any departure from this will have to be done on your own responsibility. Whereas now, all the teacher on the subject can say, is that such and such is the method of which he approves, but when asked to give his grounds for choosing that particular method he has to fall back upon the plea of his own experience.

8. Does the position of the patient make any difference to the dangers of anæsthetics? I suppose we all prefer to have a patient in the prone position, although, personally, I have never experienced any difficulty with patients in other positions. If we believe that the dangers in the administration of chloroform lie in the respiratory and not in the cardiac centres, we ought, theoretically, to be indifferent to the position, but I take it that the firmest believers in that school would much prefer to have their patients flat on their backs during the administration of chloroform. Personally, I always consider that there is an additional element of danger if my patient is in any other position than the recumbent.

9. If there is one point more than another which we are anxious to clear up with regard to anæsthetics, it is, how far the present condition of our patient influences the dangers of administration. First of all with regard to the circulation, I am one of those who believe that the heart is the important factor in the majority of the deaths from anæsthetics. There can be no question that in nearly all the *post-mortem* examinations after death from anæsthetics some organic change in the substance of the heart has been discovered.

In the present state of our knowledge, I regard organic valvular disease of the heart as a less dangerous indication than a weak flabby heart with a small quick pulse. People of a flabby type, with muffled heart sounds, and an easily compressed quick pulse, take anæsthetics worse than any other in my opinion. But I feel quite certain of this fact that, let us examine never so carefully some persons, we shall not be able to discover any fault with their organs of circulation, and yet when they take anæsthetics, and more especially chloroform, we shall find that they will exhibit such dangerous depression of the circulation as to put them to a great risk. I suppose that nearly everyone of us who has administered anæsthetics a great number of times has had close shaves. I know I have had several, and in all my cases the dangerous factor has been the depression of the circulation. I have sometimes lost the pulse at the wrist, and very nearly the heart sounds, which is, I expect, the experience of a large number of anæsthetists. Now we do not want these close shaves. I take it that the more close shaves we have, so shall we have the more deaths; and the only way we can get any other evidence than that of personal experience with regard to them is by means of clinical records.

The question of ether *versus* chloroform is intimately mixed up with the question of the circulation; but I do not intend to go into the argument as to their relative values in this direction, although I should like to say a few words. In my opinion we must regard ether as a general stimulant to the circulation, stronger even than alcohol, although the Hyderabad Commission imply the contrary.

Speaking as an anæsthetist it has, for years, appeared to me that the vital difference between ether and chloroform as regards the circulation was this, that ether acts as a stimulant to the circulation, just like alcohol, up to a certain point, but beyond that it becomes just as depressing as chloroform; whilst chloroform is from first to last, from the moment of its administration, a depressant to the circulation. The exhibition of ether as an anæsthetic need not be pushed so far as to produce its depressant effects, even for the most trying operation, and herein lies its main advantage. My experience with the two drugs in relation to the circulation is, that anæsthesia, sufficient to keep a patient absolutely still under any operation, may be produced by ether, without any practical influence upon the circulation, whereas the same cannot be said with regard to chloroform. Now with regard to the respiratory organs, there are only two conditions of the respiratory organs which I have found to require special precaution as regards anæsthetics, namely, pleural effusion, and bronchitis, or a tendency to bronchitis,—the former requires a very tender administration of the anæsthetic; indeed in some cases of extensive effusion with displacement of neighbouring organs, it is better to do without an anæsthetic if possible. Bronchitis requires a very careful administration of ether—in fact, bronchitic patients do not take ether alone at all well, they take a mixture of ether and chloroform much better. It is commonly stated that persons suffering from albuminuria should take chloroform instead of ether, but I am unaware of any authentic data in support of this statement.

The condition of the pupils of the patient previous to the administration of an anæsthetic is, in my opinion, a very important item, for it is not uncommon to find that owing to the previous administration of drugs their normal sensitiveness is quite altered, and we learn that we cannot depend upon their reaction as a guide to the condition of our patient.

I now come to the record of the administration of the anæsthetic—in this we shall require notes, at short intervals of, say, half-a-minute, up to the time when anæsthesia is considered by the administrator to be sufficiently complete for the operation. These notes must contain a record of the time, the amount of anæsthetic, the pulse rate and condition, the character and rapidity of the respiration, the conjunctival reflex, the reaction of the pupils to light, the colour and general appearance of the patient, and any other remarks the administrator or his clerk may consider desirable. After the operation is begun it would probably be unnecessary to take notes at shorter intervals than one minute; and in long operations, except when some change in the patient indicated the necessity, notes every two or three minutes would be sufficient. After the operation is done the notes should be continued until the patient's reflexes and sensitiveness to pain are restored, for dangers and even deaths have occurred from what has been called the syncope of sickness, or post-operation syncope. Many such cases have been reported in our medical journals, where death has suddenly occurred from syncope some few minutes after the administration of the anæsthetic has been discontinued. These deaths are, in my opinion, clearly due to the depression of the circulation brought about by the anæsthetic, plus the extra depression due to the supervening sickness, although the patient does not vomit. One such death has been reported in Sydney, and no doubt many of us have had similar cases, only differing in this fact, that they have not had a fatal termination. I had a very severe case of this kind not long since, in a young, strong, healthy woman, of about 25. The operation was not a severe one, and the subsequent faintness could not be attributed to shock—for the pulse and respiration were both good and

regular until the operation was completed, and the anæsthesia was never deep enough to do more than to render the conjunctival reflex sluggish; and yet she got so alarmingly faint about one minute after the anæsthetic was discontinued that we were obliged to invert her; even then it was some time before the pulse returned to the wrist. Those cases are dangerously deceptive in consequence of the heart being the only organ affected, the respiration and reflexes remaining normal till the heart stops.

In the last report of the Hyderabad Commission there is a series of reports of the administration of chloroform at the Afzulung Hospital, but valuable as these reports are, they would have been much more valuable had they contained full details of the mode of administration, the amount of chloroform used, the pulse rate and condition, and the state of the pupils. These particulars have not been reported, because the Commission came to the conclusion that in order to give chloroform with perfect safety it was only necessary to watch the regularity of the respirations and to give the anæsthetic until the cornea was insensitive. These conclusions, however, have not met with the general support of the profession. What harm there can arise from an anæsthetist watching his patient all round, I am at a loss to see, why he should not learn the condition of the circulation and the activity of the pupils as well as the character of the respiration and the sensitiveness of the cornea, I am at a loss to know. I do not know anyone who advises that the pulse should be taken as a guide in the administration of chloroform, although the Commission states that, "It is sufficient to recall the fact that deaths with chloroform have, with few exceptions, happened in the practice of those who take the pulse as a guide as to its effects." And curiously enough, further on in the sentence, the Commission used the strongest argument against their own conclusion by saying, "It is sufficient to repeat that the pulse can only give indications of actual danger and of abnormal administration." That is exactly the reason why, in the opinion of a very large number of anæsthetists, the pulse should be watched, because it does give an indication of danger, and of abnormal administration. What we really want at the present time is that we may, by the careful examination of a large number of cases, be able to lay our hands on the indications of danger and the signs of abnormal administrations; if we can only do this it will be worth any amount of trouble. I do not anticipate either by the investigation which is being carried on in England, or by that which I hope will ere long be started here, that we shall derive any particular information as to the relative advantages of ether and chloroform; in my opinion each possesses advantages which are wanting in the other, and for this reason they will be used in particular cases with corresponding benefit. For I take it that he is the best anæsthetist who suits his anæsthetic to his patient, and not he who can see no advantage in any other drug than the one he is accustomed to. I am quite sure that there are patients to whom the administration of chloroform as an anæsthetic would be a dangerous practice, but to whom ether might with safety be given; no doubt we shall, by these reports, gain some valuable information in this direction; we shall, I feel sure, be able to separate our chloroform cases from our ether cases with more safety; but I am strongly of opinion that we shall now and again, in spite of all our knowledge, come across cases which will give no indication that they are bad subjects for an anæsthetic,—what would to another be a perfectly safe administration would for them be an abnormal one; it is for such cases as these that we want a danger signal before the patient is irretrievably lost. It is no real satisfaction to us clinically to find after death that our patient was suffering from a fatty, or any other peculiar condition of the heart; we

know perfectly well that whether we find anything wrong *post-mortem*, or not, that if a person died from the administration of an anæsthetic that that person inhaled sufficient of the drug to cause his death. The most important questions we have to ask ourselves with regard to these deaths is whether we cannot, by close investigation, find some signs of danger in time to stop the further administration of the anæsthetic. The full clinical record of cases in which dangerous symptoms have appeared will, I believe, be the greatest help to us in this direction.

In order that these records shall be of real value it will be absolutely necessary that notes be taken during the course of the administration, and not be made up afterwards, for I am quite certain from personal experience that it is impossible to recollect the various symptoms unless they are jotted down at the time of their appearance. In this I am borne out by a remark of Surgeon-Major Laurie in the last Report of the Hyderabad Commission, he says, "In this case, after the patient had been removed, one of the most intelligent students was made to describe from memory what had happened during the administration. He could only recall very imperfectly and inaccurately what he had seen a few minutes before. For example, he was under the impression that full anæsthesia had been produced in four minutes instead of six. The experiment was repeated in every case subsequently, with the result, that though the bystanders were always warned to pay particular attention with a view to giving evidence afterwards, in no single instance could the witness give anything like an accurate description of what occurred during the administration of the anæsthetic. The fact that it is extraordinarily difficult to remember precisely what takes place when everything is normal during an administration shows how entirely unreliable and worthless statements made from memory by the competent witnesses who have recorded human deaths under anæsthesia must be when they are obscured by the shock of a patient dying, and by the excitement of frantic efforts to restore animation."

Case.

- Sex, Age and occupation ...
- Operation
- When and Where
- Previous history
- Anæsthetic and Method
- Position of Patient
- Present condition
- Circulation
- Respiration
- Urine
- Pupils
- General

Remarks—
Administrator
Clerk

Anæsthesia begun, continued, and ended—see abbreviations.	Time.	Amt. in use.	Pulse rate and condition.	Resp. rate and condition.	Conjunctival reflex.	Pupillary reflex.	Colour of Patient.	Clover's App. Parts of Ether.	Remarks.

ABBREVIATIONS. —A. Anæsthetic being given; A.D., Anæsthetic discontinued; Op., Operation going on. Good, 1; Fair, 2; Indifferent, 3; Bad, 4.

Synopsis of Deaths from Anæsthetics in New South Wales since 1877.

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IN the preparation of the following paper, I have to acknowledge the kind and courteous assistance rendered to me by the late Henry Shiels, Esq., J.P., late coroner for the City of Sydney, as well as Mr. Charles Smith, senior clerk at the coroner's court, to both of whom I am indebted for enabling me to obtain references from official documents.

Of thirty-one deaths recorded, I have, up to the present date, been able to obtain particulars of twenty-six, and I am in hopes that the publication of these cases may facilitate my obtaining particulars of other cases that may not have been published, by inducing members of the medical profession to forward to me details of such cases that may have come under their notice, so as to enable me to correct, revise, and amplify this paper for the information of future sessions of Congress. I am also desirous that other members of Congress may be induced to tabulate and classify similar information concerning deaths under anæsthetics that may have occurred in the other colonies. Of the twenty-six fatal cases occurring during the administration of anæsthetics here summarised from the records of inquests held thereon, seventeen are stated, in the medical evidence, to have occurred from syncope or primary failure of the heart's action. Critical examination of the symptoms preceding death, and the *post-mortem* appearances in some of these cases may cause some modification in this nomenclature. Eight cases may be attributed to primary failure of respiration, while one case is set down to idiosyncrasy, producing intolerance of chloroform, so much so that two inhalations of twenty minims each produced death.

Of all these cases, two (cases 3 and 20) had taken chloroform previously with impunity. Four had, just prior to the time of administration, or some time previously, lived freely (cases 2, 21, 23, 26). With reference to heart disease, of such interest to the anæsthetist, the following facts will prove interesting:—In twelve cases (1, 2, 3, 4, 8, 10, 12, 15, 19, 21, 23, 24), that is more than one-third of the number of fatal cases, the heart was found to be perfectly healthy, while in nine instances (9, 11, 12, 14, 16, 17, 20, 21, 25) the heart was organically diseased in structure through fatty infiltration or degeneration. In two cases (1, 22), though the heart substance and valves were healthy, there was atheromatous deposit in the ascending aorta. In three cases (5, 6, 18) the heart was thin-walled, but otherwise only slightly affected by disease; and in only one case (14) was there any valvular disease noticed. In case 26, no mention was recorded of the condition of the heart. Extensive pleural adhesions were found in nine cases (2, 7, 9, 14, 18, 20, 21, 22, 25), of which, strange to say, only two (7, 18) died of primary failure of respiration, while in five cases (6,* 10,* 19,* 21, 22) there was evidence of old-standing intra-cranial mischief, indicated by adhesions between dura mater and membranes of the brain; and in those cases marked * death primarily commenced with failure of respiration.

The small quantities of anæsthetic stated to have been used with fatal results is remarkable, especially as of the quantity mentioned all could not have been inhaled by the patient. Of chloroform *m* 40, case 15; 3 i, cases 2, 9, 11; 3 ijs, cases 1, 7, 17; 3 ii, cases 3, 4, 6, 8, 14, 23; 3 ijs, case 24; 3 iii, case 12. In cases 13, 16, 18, 20, the quantity has not been recorded. The A.C.E. mixture, 3 iii, case 5; and 3 vii, case 21. In case 18, quantity not recorded. In case 22, 3 ii of chloroform were first administered, and followed by ether, the quantity of which is not recorded; and in case 10, a mixture of ether and chloroform was used, but the proportion and quantity not mentioned. In case 19, 3 iii of methylene was used. In case 10, a lad, aged 13 years, was one day placed under chloroform for the purpose of having some supernumerary teeth extracted, but in consequence of his vomiting some recently ingested food, the operation was postponed till the following day, when, taking chloroform badly, ether was administered, but having taken only a very small quantity, rapid syncope was caused, and death took place in ten minutes. In this case, the *post-mortem* disclosed the brain having indications of an old abscess, the brain and membranes were congested, and a quantity of serum was in the cavities. The venous system and right side of the heart greatly congested. This death had been attributed to syncope, but the *post-mortem* appearances would indicate undue pressure on the centre of respiration, producing failure of that function in the first instance, followed subsequently by failure of the heart's action.

In case 11 the following procedure was adopted:—A quarter of a grain of morphia was injected in the first instance, then a wine-glass of brandy was administered, and in twenty minutes one drachm of chloroform was exhibited on an inhaler. In three minutes the patient struggled, and the pulse failed suddenly. In the *post-mortem* examination the lungs were found to be considerably congested, the right side of the heart and the venous system were gorged with blood. Though death is attributed to syncope, it is evident that the respiratory function was primarily at fault.

In addition to the foregoing, eight cases may be attributed to primary failure of respiration. This is well marked in cases 4 and 13; cases 1, 6, and 19 were due to rupture of blood vessels within the cranium; while cases 7, 8, 16 were apparently due to what at one time was called serous apoplexy, the appropriateness of which term has lately been disputed, and the correctness of the pathology denied. In case 7 the cause of death was attributed to congestion of the brain, followed by effusion. In case 8 the vessels of the pia-mater were gorged with blood, and serum effused between the dura and pia-mater; an excessive quantity of serum was found at the base of the brain and in the lateral ventricles; while in case 16 there was well-marked œdema of the membranes of the brain.

With reference to these three last cases, especially the case upon which I performed the *post-mortem* examination, there is a remarkable analogy between it and two other cases of death, resulting from rapid congestion of the brain, that has occurred in my experience; one was caused by an overdose of morphia, self-administered, and the other, asphyxia by drowning. In all these three cases rapid congestion of the brain was induced; the patients rallied, and gave signs of returning consciousness, then suddenly lapsed into a comatose condition, and died quickly, and a similar œdema of the membranes of the brain was found in each case.

The numerous cases in which pleuritic adhesion has been found in fatalities occurring during the administration of anæsthetics might, at first sight, induce a belief that these pleuritic adhesions predisposed towards a fatal

result. The frequency with which these adhesions are found in *post-mortem* examinations proves that they are far more general than is commonly supposed, so that I do not think that such adhesions in themselves should predispose subjects to fatal results during anæsthesia; but it must not be lost sight of that the presence of such pleural adhesions indicates a previous deterioration in the health of a subject which possibly has lowered the vitality of the system so as to predispose towards a fatal result during the administration of an anæsthetic. The same remarks can also be applied to old-standing, intra-cranial mischief, as indicated by adhesions between the dura mater and the membranes of the brain.

A careful study of these cases in detail impresses me with the importance of a thorough and careful examination of all patients about to be placed under the influence of an anæsthetic—not only the examination of the heart, upon which so much stress is always laid, but a careful and searching inquiry into the patient's antecedents and previous conditions of health. While a sound, healthy heart, having regular rhythm and vigorous impulse, has hitherto been considered essential for a patient to whom an anæsthetic is about to be administered, that very sound, healthily-working organ acting vigorously under the impetus imparted by the anæsthetic will achieve disastrous results upon diseased cerebral vessels such as occurred in cases 6, 10, and 19.

For some considerations with reference to "Ethics in the administration of anæsthetics," I must refer you to a paper on that subject published in the *Australasian Medical Gazette*,* and it is not generally known that an interesting paper upon the action of the pupil of the eye under chloroform has been published in the *Journal of Anatomy and Physiology*, volume 22, part 2, January, 1888.

Detailed Synopsis of cases in which death occurred during the administration of Anæsthetics.

Case 1.—Date of inquest, 13th February, 1877. Wm. Robertson, *æt.* 65; fine physique; Sydney Infirmary; admitted by Dr. Fream, for fracture of both bones of leg and dislocation of ankle of right leg; about $1\frac{1}{2}$ dr. chl. adm. on towel.

At first very loquacious; then violently excited; struggled for short time. When fully under influence operation performed, lasting one minute; patient's breathing then ceased; face assumed an apoplectic appearance; about five minutes between administration and alarming symptoms; artificial respiration continued three-quarters of an hour; battery.

Post-mortem by Dr. L. J. Halkett; membranes of brain much congested, blood flowing from cut veins; large effusion of blood round medulla with few clots; brain and lungs much congested, otherwise healthy; slight atheromatous deposit on aortic valves; other organs healthy.

Cause of death—Effusion of blood at base of brain constituting sanguineous apoplexy.

Case 2.—Date of inquiry, 3rd January, 1880. John Creighton, *æt.* 28, of drunken and vagrant habits; Sydney Hospital; 1 dr. chl. adm. by Dr. Thomas Browne for purpose of soothing deceased during violent attack of delirium tremens.

Chl. adm. on a towel in presence of two medical students, admitting plenty of air; directly after adm. the eyes were found staring; artificial respiration at once commenced; continued for about one hour.

* Vol. 7, page 296.

Post-mortem nineteen hours after death by H. N. Maclaurin, M.D.; left lung extensively diseased; right lung also complicated; liver fatty; other organs fairly healthy; heart healthy; no valvular disease; no clots.

Drs. Cecil Morgan and Maclaurin's opinion as to cause of death:—Syncope.

Case 3.—Date of inquest, 22nd February, 1881. Mrs. Maria Lewis, *æt.* 33; one child; of sober habits; said to have suffered from chest affection, not specified; 2 dr. chloroform administered on an inhaler by Dr. Cox at Mr. Spencer's rooms, for the purpose of having four teeth extracted.

Patient very nervous and excitable; after few whiffs became hysterical; on a second administration same excitable symptoms; on a third application went off easily, and exhibited signs of pain on the fourth tooth being drawn; during process of recovery suddenly became pallid and head dropped; face and chest were flicked with wet towel; smelling salts used and artificial respiration induced producing colour in face, but respiration very weak and no pulse; efforts continued for half an hour and galvanism applied to spine and region of heart; Dr. Cox examined heart prior to administration; had safely given chloroform to this patient on a previous occasion. Present:—Dr. Cox and subsequently (during collapse) Dr. Gillman.

Post-mortem by Drs. Gillman and Morris; membranes and superficial vessels of brain congested, also left kidney; liver and stomach healthy; stomach and intestines empty; heart thin-walled and empty; no signs of organic disease.

Cause of Death.—Syncope; probably predisposed by want of sufficient nourishment for some days previously, combined with shock of operation and the chloroform.

Case 4.—Date of inquest, 30th November, 1881. Edward Nugent, *æt.* 48, shoemaker; Sydney Hospital; 2 dr. chloroform administered on towel by Dr. Sinclair for operation for cancer of leg.

Examined by Drs. MacLaurin and Marshall, who found no signs of heart disease; about three minutes after commencement of administration face turned a dark purple colour.

Post-mortem by Dr. T. B. Belgrave; body very well nourished; brain fairly healthy; lungs free from chronic disease; liver healthy but large (4 lb. 2 oz.), and signs of slight recent congestion; kidneys, spleen, and abdominal cavity normal; heart loaded with fat on its surface, but free from fatty degeneration; valves normal; right side of heart contained a small quantity of blood.

Cause of Death.—Respiration stopped by an unforeseen influence excited by the chloroform on the nervous centre of respiration.

Case 5.—Date of inquest, 1st September, 1880. Mrs. Annie Shea, *æt.* 69, widow, two children; of sober habits; Sydney Hospital; about 3 dr. A.C.E. mixture administered on inhaler by Dr. Hastie, for the purpose of amputating left hand for necrosis.

Heart examined by Drs. Hastie and Tarrant; found to be weak in its action, but no signs of organic disease, so A.C.E. mixture used in preference to chloroform; got under influence in eight minutes quietly, without struggling. A few seconds after operation commenced pupils dilated and breathing ceased; tongue pulled forward, artificial respiration, galvanic battery, and brandy injection. Restorative measures continued for over half an hour. Present: Drs. Tarrant and Hastie, some medical students and nurses.

Post-mortem by C. K. Mackellar, M.B.; body anæmic, and tissues soft and flabby; brain anæmic; lungs fairly healthy (posterior aspect left lung congested); liver and kidneys fatty; heart thin-walled and dilated and fatty degeneration; considerable quantity dark fluid blood in both sides.

Cause of Death.—Syncope.

Case 6.—Date of inquest, 19th February, 1883. James Hinton, *æt.* 43; sober habits; submitted to operation for piles at his own residence; 2 dr. chloroform administered by Dr. Callaghan, on a flannel cone of wire.

Directly after administration artificial respiration necessary; continued nearly an hour; heart ceased to beat before respiration stopped; battery and ammonia used; prior to administration of chloroform Drs. Twynam and Callaghan examined deceased; lungs and heart sound.

Post-mortem by Dr. F. Milford; exudation of dark blood from mouth; over heart forty to fifty marks like pin-marks, extending 4 in. long and 3 in. wide; rib cartilages ossified; lungs collapsed; left lung had a few calcareous deposits at apex; heart healthy; stomach dilated and empty; other organs healthy; about 4 oz. fluid blood effused between dura and pia-mater; adhesion had taken place between dura-mater and arachnoid, on upper surface of both hemispheres; old effused lymph presented a pearly grey appearance, tracing out convolutions on both hemispheres; sanguineous serum effused into right ventricle; all blood in body fluid.

Cause of Death.—Rupture of branch of meningeal artery, causing effusion of blood between dura and pia-mater, producing compression of brain and depriving heart and lungs of nerve force, paralysing their action, previously weakened by administration of chloroform.

Case 7.—Date of inquest, 6th August, 1883. J. F. Hyles (aboriginal), *æt.* 36; Moorcliffe Hospital; operation to remove cataract of both eyes; 1½ dr. chloroform administered by Dr. Muskett on a boot.

Examined by Drs. Morgan and Muskett, no signs of organic disease; chloroform was successfully administered by Dr. Muskett the week previous, when Dr. Morgan removed a cataract from right eye; it took from eight to ten minutes to get patient under the influence; breathing was regular and pulse very good; half-way through operation breathing ceased; artificial respiration continued for thirty-five minutes; used, also, nitrite of amyl, hot cloths to heart, elevated arms, turpentine enemata, injection of ether under skin, electricity, &c.

Post-mortem by Dr. Milford, forty-eight hours after death; adhesion of pericardium to sternum, and between both layers of pleuræ; heart slightly enlarged; right auricle and ventricle gorged with fluid blood, also superior and inferior venæ cavae; walls of right side of heart atrophied, and cavities enlarged; walls of left ventricle hypertrophied, and cavity empty; small quantity of fluid blood in left auricle; valves healthy, both lungs congested, with pleural adhesions; stomach empty, and other organs healthy; brain and membranes congested; 2 oz. clear serum in right lateral ventricle; 2 oz. serous fluid effused in base of skull.

Cause of Death.—Toxic influence of chloroform on brain causing congestion, then paralysing nerve-power of brain; heart continuing to beat for some time after the lungs had ceased to respire.

Case 8.—Date of inquest, 19th October, 1883. John Dowd, *æt.* 50; in Sydney Hospital for operation on fistula-in-ano; 2 dr. chloroform administered by Dr. Muskett on a boot.

Patient very much excited; heart examined by Drs. Muskett and Brady. It took about six minutes to get patient under influence of chloroform; much excited; did not struggle much: breathing becoming irregular, chloroform withdrawn; pulse failed, and decreased rapidly; grew blue; artificial respiration for one hour, in conjunction with euemas of brandy and turpentine, nitrite of amyl, hot sponges to part, inversion, and galvanic battery.

Post-mortem by Dr. F. Milford eight hours after death; lungs healthy; heart rather large; right auricle and ventricle gorged with fluid blood; left auricle and ventricle contained blood same in character, but less in quantity; valves healthy; other organs healthy, but congested; dura-mater pale; vessels of pia-mater gorged with blood and serum effused between pia and dura-mater; 1 oz. serum at base of brain, and serum in lateral ventricles.

Cause of Death.—Coma.

Case 9.—Date of inquest, 19th May, 1884. John Daly, *æt.* 61; in Moorcliffe Hospital for cataract; about 1 dr. chloroform administered on a mask by Dr. Westrum.

Patient examined by Dr. Westrum; no sign of disease; after about thirty respirations became excited and talkative; face turned bluish colour; pulse failed; exertions for restoration continued for three-quarters of an hour, including artificial respiration; battery, and flicking heart and face with wet towel.

Post-mortem by Dr. Samuel T. Knaggs; principal organs congested; lungs showing remains of previous disease, being extensively adherent to ribs and diaphragm; heart tissue pale and flabby; organ much atrophied, and signs of extensive inflammation at anterior date; valves and main arteries healthy; brain and its membranes slightly congested, with undue quantity of serum in its membranes; ventricles showed traces of previous inflammation.

Cause of death.—Syncope.

Case 10.—Date of inquest, 17th February, 1886. Philip Norris, *æt.* 13; placed under chloroform in Albury Hospital for the purpose of having extra teeth extracted.

Heart examined by Dr. Kennedy; vomited recently ingested food, and operation postponed till next day; chloroform was administered, but patient not taking it well, ether was substituted; patient took scarcely any, and rapid syncope was caused; means for restoration were tried; used battery, and succeeded in prolonging a gasping respiration for ten minutes, when he died.

Post-mortem by Dr. A. Andrews; brain congested, and cavities contained a quantity of serum; the dura-mater on left side adherent and thickened (result of old inflammation); under it an abscess involving the outer portions of the brain substance; heart distended with fluid; blood in right cavity; all other organs congested with dark fluid blood.

Cause of Death.—Syncope.

Case 11.—Date of inquest, 15th July, 1886. William Lancaster, *æt.* 45 to 50; St. Vincent's Hospital; chloroform administered to facilitate a thorough examination of injury (compound comminuted fracture of leg). One drachm chloroform administered by Dr. Maher on an inhaler.

Drs. Keenan and Ross examined patient; Dr. Keenan injected $\frac{1}{4}$ grain of morphia to ease the pain, and afterwards gave a wine glass of brandy; chloroform administered twenty minutes after; after three minutes patient began to struggle, and pulse failed suddenly; artificial respiration at once

commenced ; legs elevated, hypodermic injection of ether, injection of brandy, nitrite of amyl, vapour of ammonia, and battery used ; these efforts continued for fifty-five minutes.

Post-mortem by Dr. Samuel T. Knaggs ; small abrasion of cuticle below and to inner side of left nipple ; rigor mortis and usual hypostatic congestion of most dependent parts of the body well marked ; lungs considerably congested ; liver, kidneys, and other tissues of body had undergone fatty degeneration ; brain healthy ; heart enlarged, right side filled with venous blood ; muscular tissues of heart had undergone fatty degeneration ; very friable and easily torn ; no valvular disease of heart ; bladder empty ; spleen normal.

Cause of Death.—Syncope.

Case 12.—Date of inquest, 7th March, 1887. William Chas. Wagstaff, *æt.* 33 ; Sydney Hospital ; amputation of fingers ; 3 dr. chloroform administered by Dr. Fisher.

Heart examined by Drs. Fisher and Clay ; when chloroform was administered patient struggled violently ; in five minutes was under the influence ; one minute after ceased breathing and grew blue in the face ; artificial respiration commenced, battery applied, and hypodermic injections of ether given ; efforts continued for twenty minutes.

Post-mortem by Dr. Samuel T. Knaggs ; brain, lungs, and kidneys very much congested ; heart enlarged, and on its surface a quantity of fat ; the muscular substance had undergone fatty degeneration ; all the other organs fairly healthy.

Cause of Death.—Syncope. "It is possible that the excitement of the heart's action, induced by the injury to deceased and the necessity for an operation, would cloak the symptoms usually attendant upon a fatty heart."

Case 13.—Date of inquest, 11th May, 1887. George Marritt, *æt.* 30 ; in Newcastle Hospital. Chloroform administered to reduce stiffness of joint of elbow which had been fractured.

Dr. Beeston examined ; heart found sound ; chloroform administered by Drs. Beeston and Kerr in the presence of Dr. Morgan ; at first took chloroform well ; about four minutes after first inhalation respiration ceased and heart's action failed ; artificial respiration and battery for twenty-five minutes.

Post-mortem by Dr. J. Harris ; all organs healthy, but congested during dying moments.

Cause of death.—Asphyxia.

Case 14.—Date of inquest, 23rd August, 1887. Mrs. Mary Gilt, *æt.* 36 ; chloroform administered in Sydney Hospital for operation for womb disease ; $1\frac{1}{2}$ to 2 dr. chloroform administered by Dr. Fisher on a flannel inhalor.

Examined by Dr. Fisher ; heart not strong, but nothing contra-indicating chloroform ; Drs. Chambers and Worrall present on the occasion ; patient took the chloroform quietly and was insensible in two minutes ; half minute after face changed colour, and artificial respiration resorted to ; breathing re-established, but only for short time ; subcutaneous injections of ether ; battery and nitrite of amyl employed for over an hour ; patient had been placed under chloroform a week previous and took it well.

Post-mortem by Dr. Samuel T. Knaggs ; fairly well nourished body ; rigor mortis well marked ; usual hypostatic congestion posterior part of body ; brain, liver, kidneys, and spleen healthy ; left lung showed signs of old

inflammation, the pleura being adherent to ribs and diaphragm; heart had undergone fatty infiltration; valves of left side diseased, atheromatous deposit; other valves fairly healthy; main artery leading from heart dilated, and had also undergone atheromatous degeneration.

Cause of Death.—Syncope.

Case 15.—Date of inquest, 25th August, 1887. John D. Rhodes (age not given); strong and healthy labouring man, occasionally intemperate; chloroform administered at Goulburn Hospital for reducing dislocation of right thumb; about 40 minims chloroform given by Dr. Ray.

Patient was examined by Drs. Ray and M'Killop; 20 minims chloroform caused patient to get slightly under influence, and struggled violently; another dose of same quantity given; breathing became bad and face livid; patient responded to artificial respiration; then rigidity and contraction of muscles set in; extreme lividity and cessation of breathing.

Post-mortem by Dr. P. H. Gentle; heart, normal size and healthy; cavities full of blood; lungs congested; liver healthy.

Cause of Death.—Paralysis of heart by the inhalation of chloroform "in a subject who was intolerant of the drug without knowing it. Such idiosyncrasies one only finds out by experience."

Case 16.—Date of inquest, 23rd October, 1887. Mrs. J. C. Campbell, *æt.* 34, native of India; three children; submitted to operation for ovarian tumour at Dr. Wood's private hospital, Clunes Cottage, Petersham.

Heart examined by Dr. Wood, and chloroform administered by him (quantity not stated). Patient was confined on 18th June; has been ailing since. (Evidence not complete.)

Post-mortem by Dr. Samuel T. Knaggs; cystic tumour, about size of small orange, attached to the ovary, and lying between the folds of the broad ligament; much local inflammation surrounding this part, which had caused adhesion between the bowels, ovary, womb, and abdominal walls; an extensive abscess in the tissues of the left side of abdominal wall, containing 3 or 4 oz. of purulent matter; heart pale and flabby, with signs of having undergone extensive fatty infiltration; valves and other organs healthy; considerable œdema of membranes of brain.

Cause of Death.—Depressing action of chloroform upon a heart enfeebled by fatty infiltration.

Case 17.—Date of inquest, 2nd March, 1888. Mrs. M. A. Williams, *æt.* 49; sober habits; history of hysterical and fainting fits; chloroform administered in Prince Alfred Hospital in order to remove left breast for cancer; 1½ dr. chloroform on cone-shaped piece of lint given by Dr. M'Allister after he and Dr. Blaxland had examined patient's heart, which was found to be slightly weak.

In seven minutes operation commenced; pulse became feeble and face livid; artificial respiration induced; battery at intervals; subcutaneous injection of ether, cold water dashed on face and chest; efforts continued for an hour.

Post-mortem by Dr. Samuel T. Knaggs; body well nourished; muscular tissue of heart had undergone fatty infiltration, and large deposit of fat on the anterior surface of heart.

Cause of Death.—Syncope, the influence of chloroform depressing a heart weakened by fatty degeneration.

Case 18.—Date of inquest, 2nd April, 1888. Lee Yum Kay, Chinese labourer, *æt.* 54; operation to relieve breathing and prolong life performed

in Sydney Hospital; patient suffered from pleurisy; had undergone two previous operations, with no bad symptoms, under chloroform; Dr. Henry administered on the first and Dr. Fisher on the second occasion; patient's heart had been examined each time; Dr. Henry gave A.C.E. mixture, Dr. Fisher tapping chest to relieve breathing and prolong life; operation finished before dangerous symptoms were noticed; breathing failed; responded to artificial respiration, but heart's action failed; hypodermic injection of ether, battery used; anæsthetic had been used ten minutes before dangerous symptoms occurred.

Post-mortem by Dr. Samuel T. Knaggs; body badly nourished; right side of thorax filled with large quantity of sero-purulent fluid tinged with blood, completely compressing right lung and pushing liver and other important organs to left side; heart large and flabby, and pericardium, containing a quantity of serum.

Cause of Death.—Syncope during operation of tapping for pleurisy.

Case 19.—Date of inquest, 7th February, 1889. James Maxton, *æt.* 33; intemperate habits; Sydney Hospital; anæsthetic administered for removing a piece of bone projecting from left side of pelvis.

Heart examined by two medical men; 3 dr. methylene administered by Drs. Henry and Fisher on a piece of lint; patient struggled a good deal, and it took eight minutes to bring him fully under the influence. Dr. O'Connor performed the operation in about four minutes, during which time the breathing, pulse, and pupils were normal; suddenly the face turned livid, and breathing became stertorous; after a few seconds the breathing ceased, pupils dilated widely, pulse scarcely perceptible; face turned pale; artificial respiration kept up for fifty-five minutes; galvanism, and ether injected. (It has since been ascertained that this patient was an epileptic.)

Post-mortem by Dr. Goode; heart and lungs healthy; liver enlarged and fatty; kidneys enlarged and congested; pyelitis with pus in pelvis of kidneys; brain showed old and extensive adhesions of dura-mater; serous exudations in meshes of pia-mater; engorgement of large veins on surface; sanguineous serum in ventricles, and numerous small hemorrhagic exudations of blood into the corpus striatum; it was considered that the hemorrhages were caused by weak walls of cerebral vessels by patient struggling while under influence of anæsthetic, death being caused by inhibition of cardiac mechanism.

Case 20.—Date of inquest, 27th September, 1889. Patrick Walsh, *æt.* 40, in Sydney Hospital; had been twice under chloroform previously without mishap; heart examined, and found sound; chloroform administered by Dr. Wade on lint, for removal of ulcer in left ear.

Operation was commenced, and in half a minute patient changed colour and collapsed; operation discontinued, and artificial respiration and other means for resuscitation kept up one hour.

Post-mortem by Dr. Samuel T. Knaggs; body well nourished; rigor mortis well marked; membranes of brain, liver, kidneys, spleen and lungs very congested; old pleuritic disease of right lung; stomach nearly empty; gullet, liver, stomach and kidneys showed signs of alcoholic excess; heart very flabby to naked eye; otherwise very healthy; by microscopic examination, tissues had undergone fatty infiltration; about 2 dr. fluid in pericardium; brain and meninges gorged with blood.

Cause of Death.—Syncope.

Case 21.—Date of inquest, 9th August, 1890. David Busby, *æt.* 43; Prince Alfred Hospital, for amputation of left thumb; Drs. Purser and Moreton examined heart; no valvular disease; 7 dr. A.C.E. mixture administered by Dr. Purser in perforated leather mask.

Excitable stage manifested in eight minutes, and lasted one minute; patient tried to articulate, then became perfectly rigid in an opisthotonoid manner, throwing head back and extending limbs; mask removed, and limbs became flaccid slowly; lips were livid; iris reflex responded to light, and regular breathing; when about to readminister anæsthetic breathing ceased; temporal pulse imperceptible; inversion adopted; artificial respiration; hypodermic injection of ether; in two or three minutes gavo several long-drawn gasps and face became more livid; eight or ten drops nitrite of amyl exhibited; battery and hot sponges over heart; efforts continued for one hour.

Post-mortem by Dr. G. E. Rennie; *post-mortem* lividity well marked; lungs congested; old pleuritic adhesion at right apex; heart had undergone fatty degeneration, as well as fatty deposit; walls of left ventricle hypertrophied with striæ of fat invading muscular tissue; right ventricle heart wall very thin, and myocardium in some places being almost replaced by fat; atheromatous patches in aorta; valves normal; other internal organs congested; kidneys granular, with cyst in substance; stomach and intestines healthy.

Cause of Death—Syncope, due to fatty degeneration of heart.

Case 22.—Date of inquest, 21st March, 1891. David Proudfoot, *æt.* 55; at one time heavy drinker, now teetotaller; operation for fistula-in-ano in St. Kilda House Private Hospital.

Heart examined by Drs. Knaggs and Crago; during eight minutes Dr. Crago administered about 2 dr. chloroform in a mask, then commenced with ether; up to this time patient took it well; pulse good; one minute after ether used skin became livid, pulse began to fail; breathing stertorous; at this time Dr. Knaggs was operating; tongue pulled forward and chin raised; operation concluded; artificial respiration for over half-an-hour, in addition to other means, such as nitrite of amyl, injection of ether into tissue, injections of hot brandy and water, hot cloths and mustard over region of heart, surface of body kept warm with hot bottles and blankets.

Post-mortem by Dr. Milford, assisted by Prof. Wilson; cadaveric lividity on dependent portions of trunk, forearms and neck well marked; excess of adipose tissue in abdomen; other organs healthy; slight adhesion between dura-mater and skull; on external surface of heart, right aspect, a small deposit of sub-pericardial fat; otherwise fairly healthy; valves competent; small patch of atheromatous deposit in ascending aorta; coronary arteries had undergone slight atheromatous degeneration; other organs healthy; an excess of fat throughout whole body; no food in stomach.

Cause of Death.—Syncope.

Case 23.—Date of inquest, October, 1892; Joseph Charles Harrison (no age given); operation for hemorrhoids at own residence.

Heart examined by Drs. Kelly and Davidson; about 2 dr. chloroform given from an inhalor; almost immediately deceased commenced struggling violently; controlled with difficulty; pulse remained good; in half a minute patient began to breathe heavily; manifested dangerous symptoms, and failed to respond to artificial respiration, which was promptly adopted and kept up for half an hour, in addition to which ether was injected into tissues; stimulants administered and inversion adopted.

Post-mortem, by Dr. Bott; all organs healthy, heart presenting usual appearances found in death from syncope.

Cause of Death.—Syncope, accelerated by fear and the inhalation of chloroform.

NOTE:—Mucous membrane of stomach congested and in such a condition usually caused by taking alcohol in excess.

Case 24.—Date of inquest, 10th June, 1878. John Boyd, *æt.* 43; operation on cancer in lower lip at Dr. Atherton's surgery.

Heart examined by Dr. Deek, who administered $2\frac{1}{2}$ dr. of chloroform from an inhaler; patient struggled violently; when quiet the administration was discontinued and growth removed, patient breathing freely; on the introduction of needles to suture the lip deceased's breathing stopped and no pulse could be detected; he was at once placed on the floor and artificial respiration induced; battery used, and efforts continued for nearly an hour.

Post-mortem, by Dr. C. W. Morgan; lungs and heart healthy; chambers of heart empty of blood except right auricle which contained a small quantity fluid venous blood; other organs fairly healthy; stomach empty.

Cause of Death.—Collapse, or a sudden cessation of the action of the sympathetic system of nerves under influence of chloroform.

Case 25.—Date of inquest, 13th June, 1891. Alfred E. Bawtree, *æt.* 38; admitted Prince Alfred Hospital for cancer of lower jaw and tongue.

Examined by Dr. MacCormick; no contra-indication against anæsthetic; mixture of chloroform and ether administered by Dr. L. Neill, and in four minutes showed signs of great excitement requiring restraint; was wheeled into operating-room, then found not completely under influence of drug; more was about to be administered when lips became dusky and breathing ceased; artificial respiration resorted to for an hour.

Post-mortem by Dr. Rennie; body strong and muscular; some pleural adhesions in chest; heart flabby; muscular tissue, especially of right ventricle pale and soft, and apex showed distinct fatty degeneration; right auricle contained only a small amount of dark fluid blood; both lungs healthy; liver fatty with fibroid changes; brain and all other organs healthy.

Death due to syncope, from fatty heart and nervous excitement.

Case 26.—Date of inquest, 21st September, 1891. Thomas Peake, *æt.* 42, carpenter; operation in St. Kilda House Private Hospital for extravasation.

Heart examined by Dr. Huxtable and considered a fit subject; chloroform administered in the usual manner, about 2 dr. on a mask; after about six or seven minutes patient struggled violently; on being placed in position for operation breathing ceased and lips became livid; responded at first to artificial respiration; pulse very bad, and just as necessary incision was about to be made breathing ceased; patient became livid and pulse ceased; usual restorative measures adopted without avail.

Post-mortem by Dr. Milford in presence of Drs. Huxtable, Hull, and Rennie.

Death due to asphyxia, caused by chloroform vapour, and accelerated by state of the lungs; also due to syncope, caused by depressed state of nervous system.

The Mental Effect of Chloroform inhalation as an Element of Danger in the Production of Syncope.

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IN my experience there has occurred, at an early stage of chloroform administration, primary heart failure. One case comes prominently to mind, in which there was sudden syncope with no preliminary respiratory failure, and even when the latter condition also supervened, without the slightest difficulty could that function be fully re-established, and, in fact, did then continue spontaneously long after the heart had ceased to beat. But if the patient be once fully under the anæsthetic—the danger signal is always first the failing heart. The question naturally arises, why is it that the drug in the one case primarily affects the heart and in another the respiration? In some of the former cases, few it may be, I feel sure, from personal experience, the explanation lies in the fact that chloroform, apart from its usual toxic effects, may help to kill by the cerebral symptoms it may excite in certain individuals. One fact is always apt to be overlooked—the individual personal element. Herein the Hyderabad Commission failed in that they arrived at certain conclusions as regards the effects of chloroform on men from experiments on dogs only. Why, I think that even racial difference may explain the different results obtained at London and Edinburgh. In this respect, as regards individual differences, there are two points I desire to bring under your notice; the first is, that in certain persons there may be such a thing as the pangs of chloroform inhalation—in other words that the inhalation may produce cerebral symptoms involving mental torture, in comparison with which any physical pain is a mere nothing, and the second, more especially of importance in conjunction with this, the varying time at which loss of consciousness may occur. On these points, experiments on dogs are, in my opinion, of little conclusive use—personal experience is also necessary. It is like the pain of neuralgia, it is one thing to know, another to have felt it, and I, gentlemen, have felt the pangs of chloroform inhalation. For your information then allow me rather fully to detail my own experience when taking chloroform for a dental operation.

Of its physiological effects I was well aware, there was only one I wished to experience, and that was loss of consciousness, and to hasten its onset I did everything in my power—by taking deep breaths—but all was to no purpose, it did not come. Instead, I was a victim to the most terrible sensations. First a ringing in my ears, rising ever louder and louder as each regular and, to me, relentless drop fell on the mask, till at last the noise was overwhelming. Added to this, I was soon being whirled along in an awful vertigo, at one time seeming to rise up and career through space, at another to sink down swiftly into the earth. So completely was I dazed that it required all the exercise of my will to prevent myself struggling and clutching at the chair on which I was lying, and, from the feelings of nausea excited, to control the tendency to vomiting. This was succeeded by the thrall of a

horrible nightmare, with a sense of some strangling overpowering influence and a feeling of impending mental annihilation. Helpless, I could not stir hand or foot, nor could I by any means signal to the operator the mental anguish I was suffering, for even the power to cry out was gone. Yet all this time I was quite conscious. I could hear the trams passing up and down the street and the anæsthetist coolly remarking that I was nearly off, but I was taking a great quantity of the drug. However, finally the ego yielded up its last fortress, the auditory centre, and like a flash came the long-wished for oblivion. Unfortunately before the operation was completed, as suddenly as I had gone off, I came round, and in the full possession of all my senses. I remember saying that I would rather endure the pain of having every tooth pulled than again undergo the pangs of chloroform inhalation. However, I was informed I had taken the drug well and quietly, so that there had been no indication to the operator of the anguish endured, and I was persuaded into a second trial. With the first few inhalations the torture recommenced, but could not for long be borne by the weakened nervous system, soon unconsciousness came, quickly enough this time from a sudden syncope, with not the slightest premonitory evidence of respiratory failure. Fortunately the administrator was a skilled anæsthetist, but even then with great difficulty was I brought round. Now, although a few extra whiffs had been given, the intoxicating effects of the drug were well marked, and I drunkenly (for want of a better word) insisted, in spite of the operators reluctance, on having it a third time, and took it quickly and, note well, painlessly.

Now as to the cause of my heart failing, syncopal attacks from physical pain are daily seen in the accident ward, and there is no reason why it should not result from severe cerebral sensations, which must produce considerable nerve exhaustion and shock. This is far different from fainting from fear at the idea of taking chloroform or during its administration. Somewhat analogous conditions are syncope resulting from the patient not being quite "off" when the operation is started, and consequently feeling the pain and shock, or that ensuing an operation, when the patient is rousing and becomes conscious to pain.

Of course the pangs may be endured *if brief in duration*; the trouble is where loss of consciousness is delayed, and I believe from my own experience it may be one of the last physiological effects, and as long as it does not supervene there is risk that there may even be syncope from fear. Also, it is a question whether our present tests are sufficient to tell if the patient be unconscious. I feel sure some patients can hear up to the very moment of the abolition of the eye reflex. Again, it is possible that these pangs, vertigo for example, may explain the clutching and tendency to vomiting so often met with, and the nightmare, the struggling—the movements being at one time purposive to get away from the source of annoyance and at another reflex in response to dreams, and even dreams might be, if unpleasant, an element of danger to a weak heart, for who has not wakened out of some horrible dream with clammy skin and throbbing heart—hardly an ideal state for chloroform inhalation. In this respect it may be mentioned that alcoholics, who are notably not amenable to the action of narcotics, struggle furiously as a rule under chloroform. The result of the syncope, of course, will depend on the quantity of the drug absorbed. I believe if my heart had been well under its toxic effect when the failure took place that I would not have recovered; other factors, of course, would be the presence of any heart disease, or whether there was much exhaustion from struggling.

As to the cause of these unpleasant sensations, it is only possible to theorise. Perhaps some local action on the terminal branches of the nerves of special sense in the mouth, nose, and throat in certain individuals might produce them, for it is a matter of experience how nicely and quietly chloroform is always taken through a tracheotomy tube.

The object of my paper, chiefly, is to bring under your notice the fact that there are others who, like myself, will have to undergo the pangs of chloroform inhalation, and the question is, "Is there any necessity why they should?" There is little doubt that the ideal condition to be reached as soon as possible is that of dreamless sleep. In my third experience it was shown that absorption of a certain quantity of the drug itself, even though the patient come right round again, may so modify the individual that he afterwards takes it speedily and painlessly. One London authority believes in making his subjects intoxicated first, but I think in morphia we have a reliable means of bringing about that condition in which sleep will be the first effect induced by chloroform inhalation, and I have always found it to act satisfactorily.

In conclusion, let me add as one who has fully experienced the helplessness of treating chloroform syncope with the present methods, that Maas' modification of König's plan for heart resuscitation seems to me to have solved the problem of what may be termed "artificial circulation." I have tried it in three cases of syncope from different causes, viz., oil embolism, chloroform, and strychnine poisoning. In all these, rapid and vigorous intermittent pressure was made over the cardiac region at the rate of 120 per minute, with the result that by purely mechanical means the circulation was re-established, though only permanently in the chloroform case. Two of these cases were of interest in showing what Maas lays down, "that a certain pliability of the chest wall is needed, but is rarely absent even in old people, for two of my patients were over sixty years of age, and there was no difficulty in applying the method. For anyone interested, a brief description will be found in the *British Medical Journal*, April 9th, 1892; also the reference to the German journal, the article in which will repay perusal.

The Drainage-tube.—Its Disadvantages, or how it may exert a prejudicial effect on the healing of a wound.

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IN preface to my remarks on this subject, let it be clearly understood that no attempt is made to bring discredit on such an important factor in surgical science as *drainage*. At the same time, by pointing out the most apparent disadvantages of its usual medium, the *drainage-tube*, I will endeavour to show that there are cases which do *not* require, which would, in truth, benefit much by its neglect.

Now, of late years there has been a growing tendency among surgeons to place less reliance on drainage, even in abdominal section, where it was once thought indispensable. Men like Sir Spencer Wells and Lawson Tait are discarding its use, and have found success where success was hardly hoped for, and where, with drainage, they were wont rather to witness failure. It is on the strength of such authority that I have the presumption to say and show how drainage, as it is commonly carried out, may sometimes fail to be an unmixed blessing; for though early teaching tends to make us regard it as so essential to the proper healing of a wound that its omission appears in the light of culpable neglect, nevertheless observation and experience go strongly to prove that many a wound would have healed better, quicker, with less trouble and anxiety to the surgeon, less pain to the patient, had it been entirely disregarded, and if the time and labour spent in providing it had instead been expended in securing the *proper apposition of surfaces, proper pressure applied to diminish or prevent its requirement*. "*Prevention*," in fact, "*better than cure*."

Before going further, however, common sense asks one to differentiate the wounds to which the foregoing statement specially refers, and then I shall be at liberty to lay before you some facts which seem to me to bear it out.

Of course, in wounds where primary union, or healing by the "*first intention*," has been attempted and failed, or never could be hoped for from the first, and which, therefore, can only heal by granulation; in wounds, also, which exist merely as the means of reaching, emptying, and healing large cavities whence the discharge will be copious, long-continued, and purulent; in such wounds, I say, drainage is an absolute necessity, and the more freely it is provided the better for the wound and the patient; no one would challenge its utility, for without it the *debris* of broken-down tissue and superfluous granulation cells, cast off as pus, could not be got rid of, and the result locally and generally would be highly injurious.

But the cases, par excellence, in which the question of drainage seems the most doubtful are the wounds resulting from large surgical operations, such as deep dissection wounds, largo flap and plastic operations, or clean-cut wounds accidentally received, in which, even though the solution of continuity be extensive, there is good hope of primary union resulting should proper

care be exercised. Now, when such wounds come to be stitched we expect that there will be a certain amount of oozing, for the escape of which provision must be made, lest, if neglected, that "bête noire" of all healing, *tension*, from retained discharge, will mar our efforts; so a drain is inserted, *tube* horsehair or catgut, as fancy pleases, and the wound dressed; and the surgeon feels that he has acted with due caution. A wound so dressed often oozes for hours, and as the surgeon removes the saturated dressings he mentally pats himself on the back for having had the forethought and patience to use a drain, quite convinced that all that copious discharge would have otherwise been exerting injurious tension in the wound, and defeating his one aim, *healing by first intention*.

But now comes the question, if the drain had not been inserted, if the two surfaces of the wound had not been as it were separated by it, forming a cavity in the depth of the wound like a pit in a swamp, would all that oozing have had the same inducement to occur; would the tension so much dreaded have been a reality; would there not merely have extended from the two surfaces in fair apposition throughout their whole extent that layer of plastic lymph by which primary union is effected? No one can have failed to notice how quickly all oozing stops when the bleeding surfaces are brought carefully together, and this I maintain cannot be done if the bulk of a drain be between them—an opinion strengthened by observation. The trouble does not end here, for in cases where drainage is provided, and oozing thereby encouraged, the dressings are often quickly saturated at some point, and their antiseptic value thereupon being vastly diminished, their changing becomes a necessity. Moreover the edges of the wound get bathed and macerated by the soaked dressings. Now it is evident that the less frequently wounds of this kind have to be dressed the better, inasmuch as it irritates them more or less, and exposes them to germ infection from the air and the hands of the dresser; and in the majority of cases, where no drainage is resorted to, the oozing is so slight, that provided no warning symptoms indicating unhealthy action in the wound arise, no dressing will be required before the third or fourth day, by which time healing will be so far advanced as to greatly lessen the risk of exposure to the air, and shock and pain to the patient. Summing up then briefly, we find that by *preventing the direct coaptation of surfaces a drainage-tube often precludes the possibility of primary union, and allowing extensive oozing of blood and serum renders frequent dressings, and thereby disturbance of the wound, a necessity*.

Let us consider now another of its faults, perhaps the gravest. Its *liability to act as a medium for the intimate implanting of septic elements in the wound*. It may justly be argued that if ordinary precautions are taken the drain will be perfectly aseptic. Granted; but still the risk exists that in spite of these precautions the drain, whatever its material be, may be septic; should this happen, all the care and caution exerted throughout the operation will have been wasted; deep in the wound will be implanted the germs of suppuration, or perhaps, graver mischief. Much more is this risk increased by the *careless* after-dressing of a wound where a tube is employed; it is removed with the dirty dressings, picked out of these, coated and filled with discharge (often with a loop of silk or thread through it in the same dirty condition), it gets a superficial rinse in some lotion; after the syringing of the wound, it looks clean and is replaced, septic or aseptic, as chance may have it.

In yet another way, more insidious, more difficult to guard against, may a drainage-tube be the medium of contamination of a wound; it becomes

quickly filled with coagulated blood and serum, a soil most favourable for germ growth, and should infection of the wound occur at its surface, its rapid transmission to the deeper parts is actually favoured through the protection afforded by the walls of the tube against the antagonistic action of the granulation cells which are thrown out over the surface of the wound, and which are Nature's barriers to the ingress of septic organisms. Thus, with a favourable nidus in the albuminoid contents of the tube and under the protection of its walls, these germs penetrate to a depth in the wound that they would never otherwise have attained, and may delay over months the healing which should have taken place in a week, or, perhaps, cause irreparable mischief. There is another way in which the presence of a drainage-tube increases the susceptibility of a wound to infection; to allow of freer drainage along its track it is customary to perforate it laterally, and into these lateral openings there is a tendency for the granulating sides of the wound to bulge; now, when the tube is removed for the purpose of cleansing, these protruding granulations are more or less damaged or torn off, and a freshened and, as it were, unprotected surface is exposed anew to septic infection.

We may proceed now to certain disadvantages which arise *indirectly* from the use of a drainage-tube in a wound, the first of which is *the time required for dressing, the pain and general shock resulting thereby to the patient is increased*. No one can dispute the fact that the presence of a drain or drainage-tube delays the dressing of a wound, or that such delay, by causing longer exposure to germ infection, is injurious. More care is required in removing the dressings; the tube requires to be syringed out, and perhaps removed for this purpose, giving rise to delay and the trouble of its re-insertion, less aseptic now, perhaps, than before. The *extra pain and shock* are, alas, rendered only too evident by the patient's piteous appeal for the tube not to be touched, once he has experienced the pain of its removal and still greater torture of its being replaced; the shock, moreover, is intensified by the alarming idea the patient forms of the nature of his wound from the dimensions of the tube; faintness and vomiting frequently result, and *general depression of the system*, which cannot fail to some degree to act injuriously on the healing of the wound and affect the successful issue of the operation.

Secondly, there is its *liability to faulty insertion, faulty re-insertion, and difficulty of retention in required position*. These no doubt are minor faults, to be obviated by the exercise of a little care and trouble. Still they exist; for if the wound really requires drainage, the drain should reach to the deepest part of the wound and run to the most dependent in regard to the position of the patient; but these two important details are often neglected; a piece of tubing is inserted without regard to length or direction; the intention is good, but the end in view is not attained.

Faulty re-insertion occurs still oftener, from the difficulty experienced in replacing the tube in its passage which has contracted on its removal; it often fails to re-enter its former track, and is put in as far as, and wherever, it will go; it may actually block its former passage which, though too devious and narrow to admit the tube, is large enough to form a pocket for the very discharges it is supposed to drain. Why replace the tube it may be argued; because if a tube is used from the first it is generally found necessary to retain it for some time, and to replace the tube, or even one of smaller calibre, properly, with the patient restless or, if a child, struggling and screaming, is no easy task. Neither is its *retention in position* easy, unless

it is secured by a stitch to the edge of the wound; when, however, it has been removed and re-inserted the patient, no longer under an anæsthetic, will naturally object to the same method of procedure, and then its remaining in position is a matter of chance—it may slip right into the wound and be recovered with difficulty, or perhaps forgotten, as I have seen occur—more often it works out altogether with the movements of the dressings, as the patient tosses about, and when the wound is next dressed the position of the tube is oftener highly undesirable and even ludicrous; even when the greatest care is used to retain it the result is frequently the same.

Brief mention of these minor faults brings us to the third and most important—*its irritating action on the tissues as a foreign body*. Nothing may so delay the healing of a wound as the presence in it of some body foreign to its tissues, even though it be small, aseptic, non-irritant. Now, a drain is in the same way a *foreign element*—a cause of irritation, a drawback to rapid healing; and this fact should strongly militate against its employment, except when urgently needed. Its sinus-like track heals slowly, by granulation, with inferior tissue; more important still, the long-continued suppuration which often results vastly increases the risk of destruction of arterial walls and the disastrous results of *secondary hæmorrhage*.

Lastly, supposing that the sum total of the foregoing objections to the drainage-tube signally fails to counterbalance its great and manifold advantages, and its employment meets with favour, has it not a strong tendency in the end to *defeat its object by becoming filled with clot, and acting as a plug rather than a drain*? Be its calibre large or small, sooner or later it gets blocked with coagulated blood and serum, and then the oozing, which was encouraged in the first place by the presence of the drain, goes on, and unable any longer to escape freely, may cause tension in the wound, softening and separating its surfaces, and burrowing among the areolar tissue. The tube may thus be the direct cause of the mischief it was employed to prevent, and which, perhaps, would not have occurred had drainage been omitted. That this is so is proved by the frequency with which the removal of a drainage-tube is followed by a copious sero-sanguineous discharge.

Gentlemen, I will detain you no longer. Perhaps prejudice of what seems to me the *too universal employment* of the drainage-tube has made faults appear where no faults are, and all the foregoing objections may be thought paltry, if not absurd. If, on the contrary, you should consider the subject of sufficient importance and interest to observe, have you not already done so, and practically test the truth of what I have tried briefly to bring under your notice in this paper, I shall consider myself highly honoured and rewarded.

Magazine Rifle Bullets—Their relation to Military Surgery.

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WITH the introduction of small-bore magazine rifles into the various military services of the world, speculation has been rife as to the nature of wounds which would be caused by the bullet, and to what extent, if any, they would differ from those produced by rifle bullets of a larger calibre, which the new weapons were superseding. Some authorities predicted that the killing effects of the new rifle would be most terrible, whereas others stated that from the nature of the wounds it produced it should even be termed a "humane rifle." In the last Chilian War, where the small bore Manlicher rifle was used—the weapon now adopted by the German Army—it was reported that the proportion of killed to wounded was 1 to 4, and that the wounds were of an exceptional nature, the man being either killed at once or rapidly recovering from his wounds without complications or much suffering. At long distances the wounds in bones were clearly cut and pierced, free from splinters either of bone or lead, and with the bullet unaltered in shape. I particularly desire to draw attention to the construction of these bullets, viz., of toughened lead with a nickel-plated steel coating 0.0354 in. thick, which even after impact against solid bodies does not allow any stripping of bullet, nor even much alteration of shape. For the past twelve months experiments have been conducted both in England and Europe to ascertain the exact nature of the wounds which are produced by the various small-bore magazine rifles taken into use by the European powers, and although such experiments are far from complete, they present much of interest, and have a valuable bearing on the military surgery of the next great war.

Before fully entering into this subject I propose to submit a table showing the most salient points of the small-bore rifles, and also comparing them with those they have or are now supplanting, and others of an earlier date. The most important points to consider being the range of the rifle, size and weight of bullet, and the initial velocity of bullet at muzzle; and I have taken types of the magazine rifles—those used by Great Britain, Germany, and France—and compared them with weapons they have superseded in those countries, and also briefly alluded to the rifles which were in use prior to the introduction of breech-loading firearms, viz., from 1836 to 1855, and it will be seen that there have been three distinct eras in style and size of rifle bullets adopted:—

Name of Rifle.	Bore of Rifle.	Range as Sighted.	Weight of Bullet.	Initial velocity of bullet at muzzle per second.	Remarks on construction of Bullets.
A.—1. Brunswick, 1836.....	in. .700	yds. 400	grs. 410	} Muzzle-loaders.	
2. Minié, 1851.....	.690	1,000	386		
3. Enfield, 1855.....	.577	1,000	530		
B.—1. Snider	.577	950	480		
2. Martini-Henry	.450	1,200	410	1,362 ft.	Lead hardened with antimony.
3. Manlicher, 1871-1884	.433	1,300	386	1,427 ft.	Lead hardened with tin and antimony.
4. Gras	.433	1,300	386	1,403 ft.	Lead hardened with antimony.
C.—1. Lee-Metford	.303	3,500	217	1,850 ft.	Lead hardened with antimony with cupro-nickel envelope.
2. Manlicher, 1893	.314	3,300	227	2,034 ft.	Lead hardened and steel nickel-plated envelope.
3. Lebel	.315	3,500	231	2,067 ft.	Lead encased in an envelope of maillechort.

In 1836, or a little over 55 years ago, the first muzzle-loading rifle was introduced into the British service, known as the Brunswick rifle, having a bullet with a diameter of .700 in., weighing 557 grs., and sighted up to 400 yards. The next rifle adopted in the service was the Minié, in 1851, with a bullet of .690 in., and the sights up to 1,000 yards. A further improvement came with the Enfield, with a calibre of .577 in. Now we come on to the era when muzzle-loading rifles gave place to breechloaders, and from a bullet having a diameter of .577 in., as in the Snider, and .450 in the Martini-Henry, we come down to the present small bore of the Metford-Lee rifle, viz., 0.303 in., and the various Continental weapons of a similar calibre, and there is a possibility that even a smaller bore may eventually be adopted. What I desire to point out is that in this period, practically half a century, the size of the bullets as regards their diameter has been reduced more than half, and the constructive material of the bullet has been altered by this reduction and alteration, combined with an improved powder, a far greater initial velocity has been obtained, and with these changes three conditions have arisen, viz., greater range, a more perfect accuracy, and a far higher degree of penetration, and it is due to these conditions that the present aspect of gunshot wounds appear before us, viz., the size of the wound now produced, the penetrative effects of the missile, and the condition of wound brought about by these small-bore weapons, that opens a new era in the immediate treatment and remote effects of gunshot wounds on a modern battle-field.

In 1891, Dr. Billroth, before the Austrian Delegations on medical services in the field read a paper in which the penetrative effect of the new Manlicher rifle was clearly brought out, and this eminent authority maintained that with such weapons of precision the percentage of the wounded on a battle-field would be enormously increased, and as in most modern engagements the percentage of wounds has been over 80 per cent. from rifle fire alone, this is a matter of the most serious moment, and Dr. Billroth remarked, "Are steps taken to better the means of aid to the wounded in proportion to the increasing development of destructive agents?" this question demands the gravest consideration, and most urgent attention of the authorities who govern all military forces. In the Royal United Service Institution of April, 1892, the question of "Modern rifle bullets and their effects" is made the subject of a most valuable paper by Brigade-Surgeon Lieutenant-Colonel Godwin, Professor of Military Surgery, Army Medical School, and this author quotes the experiments made with the Lebel rifle, the small bore magazine rifle used by the French service. A rifle, as I have previously stated, with a calibre of eight mm. or .315 in., and having a bullet composed of a mixture of lead and antimony, encased in a cupro-nickel envelope, and the results obtained were compared with those effects produced by the rifle of a larger calibre, viz., the Gras—which practically corresponds to our Martini Henry. Here it was conclusively shown that the shock of impact on bony structures was always much greater with the larger and heavier bullet, which in the majority of cases smashed the limb up completely and left no doubt as to the nature of the injury, whereas in the Lebel rifle, especially over a range of 400 yards, the condition of shock was not so marked, nor was the injury to bones of that decided character as with the large bore rifle—in fact many cases had to be closely examined before a fracture could be definitely decided upon; but what I want to impress is that these experiments with the Lebel rifle were made at ranges of over 400 yards. At relatively shorter ranges, that is up to 300 yards, different results are obtained by both rifles, and these have been termed the "Explosive results," for it has been found that with rifles of the Gras or Martini-Henry stamp, at a range up to 150 yards, the destruction

and tearing of soft parts is enormous, the bones splintered beyond recognition and with large gaping wounds of exit, and similar results were witnessed with the Lebel rifle, even to a far greater range, up to 300 yards, in fact the greater lesion runs hand in hand with the greater initial velocity of the bullet, and it was found that up to 100 yards both rifles, large and small calibre, produced similar explosive effects, but over this range the larger bullet of the bore rifle lost its explosive effects, and had more of a penetrative action, whereas the small bore with its much higher velocity maintained its bone and tissue-destructive conditions up to 300 yard. As the range increased, the lesions of bone produced by bullets by either rifle lessened in proportion to increase of range, and although some differences of result were noticed they were not very marked. It was stated that at over 1,000 yards the injuries produced by the small-bore rifle were not nearly so serious as those produced by a larger weapon; in the case of the former there was far less splintering and bone-fissures than with the larger bullet.

All experiments with the magazine rifle now adopted by the British service, viz., the Lee-Metford rifle with a calibre of .303 in., made up to a range of 100 yards, have shown without any doubt that both in hard and soft tissues the "explosive effects" are most strongly brought out; bones shattered and splintered from end to end, and scattered in particles, that muscles and other tissues are brought to a condition of pulp, with a ghastly ragged wound of exit; and this condition is not the result of any stripping of the bullet nor alteration in its shape, but is entirely due to the very high velocity obtained at short ranges—a velocity due to the improved forms of powder now in use, and also to the steel covering which encases these bullets. Professor Brims lately conducted a series of experiments in Belgium with the small-bore Manser rifle, and ascertained that at 100 yards the bullet, after passing through the strongest bones of the human body, would have sufficient velocity left to be capable of penetrating four or five men in addition, and also that at long ranges, viz., from 1,500 to 1,700 yards, the wound made by the bullet had a very even and small track, the bony tissues were simply penetrated and not shattered, and that the apertures of entry and exit were very small.

Dr. Habart, of the Austrian Medical Service, came to similar conclusions after a most elaborate series of experiments with the small-bore Manlicher, when the range was not extended above 1,300 yards, but over this range and up to 2,800 yards, he stated that the conditions of clean puncture were lost, and one of splitting and tearing set up, but these results are open to objection, as at the very long ranges a diminished charge was used instead of the ordinary service charge—thus lessening the velocity of the bullet. To give some idea of the penetrative effects of this small-bore Manlicher, I will quote one or two of the experiments made by Dr. Habart, at Spandau, in April, 1892, the details of which are fully given in a recent number of the Journal of the Royal United Service Institution.

I.—Range, 55 yards.

1. Bullet passed through trunk of an oak tree 18 in. in diameter.
2. Bullet penetrated into layers of sods 39 in. thick to the depth of 19 in.
3. At a brick wall 9 in. in thickness, with a volley from 30 rifles, the volley passed through the wall.
4. Bullet passed completely through an iron plate, 6 mm. (0.236 in.) in thickness.
5. On fresh specimens of the tibia, there was the explosive action at point of entrance with splintering of bone.

From personal observation of bullet wounds produced on animals with small-bore sporting rifles, having a high velocity and with bullets specially toughened, I have seen similar results obtained—that is, at short ranges from 50 to 200 yards; the impact of the bullet, travelling at such high velocity, gives what are now termed explosive results, large wounds of entrance and gaping torn ones of exit, with a wide bullet-track through soft parts, and complete smashing up, in many cases, of the bony structures; whereas at longer ranges this condition is not seen, but cleanly-cut apertures with much less bone and tissue destruction.

The question now arises how, with such weapons as the new small-bore rifles have proved themselves to be, will the soldier fare when called upon to fight in modern warfare? I am afraid that it will go badly with him, for as the action will probably commence at a distance between 2,000 to 3,000 yards off, casualties will occur early in the day, and will increase rapidly as the forward movement progresses; and when the time comes for the small proportion of men that may be left uninjured to make the final attack, the hail of lead will be so severe that but few will return to recount their experiences, for it was found in quelling the recent Belgian riots that the wounds inflicted by the small-bore rifle at short ranges were mostly of a mortal nature. Anyhow, those hit at the long ranges will have the satisfaction of knowing that should the bullet miss a vital part they may hope for a speedy convalescence, as it has already been shown that wounds from small-bore bullets at these ranges give a minimum amount of trouble, but as from start to finish of the engagement the number of wounded will be so much in excess of those of former battle-fields, that the medical field services, unless greatly supplemented both by men, material, and means of transporting wounded from the field, will never be able to bear the strain put upon them, and the result can only be a hopeless and lamentable failure, a complete breakdown; and even granting this increased field strength to the bearer companies, it would be almost out of the question for the men to keep up with and do useful work under the storm of lead they would be exposed to—their numbers would be so thinned as to render them incapable of carrying on their work, and it would be only when the engagement slackened that bearer companies could render any material aid to what was the fighting line.

With the increase of range obtained by modern rifles, the necessity arises for many modifications in the working of bearer companies in the field. Now, the collecting and dressing stations for wounded must be placed at a greater distance in rear, in order to afford any security to the wounded even after they have received treatment and are waiting to be despatched to the rear; and with increase of distance, increase of transport is absolutely necessary.

Professor Billroth, in his speech in the Austrian delegations, has stated that the increase of the number of wounded will be so enormous that their transport from the field by bearers will be simply out of the question. Light ambulances will be necessary, and they will have to keep close up to the fighting line, and practically do the bulk of the removal. This is an entirely new departure in the medical field services, for ambulance waggons are not kept in touch with men actually engaged, but transport wounded from the collecting and dressing stations to the Field Hospitals. When we consider that dressing stations will in future have to be established from one and a half to two miles in rear of the battle, unless under very exceptional circumstances of position and shelter, some idea can be formed of the work that will be entailed in the transport of wounded from the scene of a heavy engagement.

Sir Thomas Longmore has stated, "That everything tends to show that while the number of sufferers urgently requiring help will be vastly increased in future wars, the means of affording them shelter and surgical attention will be pushed back to a greater distance than has ever before been necessary." All this is due to the great range obtained by the new rifles, and the difficulty can only be met by a very large increase in the personnel and equipment of bearer companies. In the German service over 1,000 trained men are provided with each army corps of 24,000 men, for the succour and transport of wounded, or at the rate of one for every twenty-four men going into action, and when we take into consideration those that are killed, and who need no immediate attention, it will give some idea of the numbers that will be necessary to carry out immediate aid and transport of wounded. It used, formerly, to be computed that the proportion of wounded in a general engagement, for which it would be necessary to provide assistance, was about 10 per cent., but without doubt modern weapons will cause a far heavier percentage.

One condition can be brought about, and that is every soldier should be instructed in the rendering of first aid to the injured, whether he belongs to the medical services or not, and having this knowledge he would be in a position not only to aid a wounded comrade, but in many cases attend to his own injuries, and this would be thoroughly practicable were first field-dressing packets invariably served out to each man on the eve of an action.

The subject opened up is so large and comprehensive that, with the time at our disposal, it is not possible to enter more deeply into it, and I submit this paper with all its shortcomings for your consideration, and thank you most sincerely for the attention with which you have received it.

Exhibit:—Case of Excision of Wall of Pharynx. Recovery.

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THIS case is of interest:—

- (1) To physiologists, as throwing light upon the functions of the epiglottis. When the patient is directed to swallow an oyster, it is seen to glide down over the concavo-convex posterior surface of the epiglottis. The epiglottis remains erect, and does not fall down over the orifice of the larynx.
- (2) To pathologists, as an illustration of a very malignant tumour which becomes more benign after each removal. About four years ago there was a large fungating malignant ulcer on the cheek, caused by the ulceration of an infected gland. This was freely removed, and the disease recurred four times, each recurrence being less malignant and at longer intervals. The last operation was in July, 1890, and at the present time there is no evidence of disease; the patient is strong, and carries out his occupation as miner.
- (3) Lastly, this case is of interest as showing the amount of tissue that can be removed from a dangerous region. See accompanying photo:—

A man, Dydson, aged forty-three, had epithelioma of the lower lip. This was removed by a V-shaped incision, but in eight months (Dec. 30, 1888) a secondary infection of the submaxillary lymphatic glands appeared. This was allowed to involve the skin and infiltrate the surrounding tissue. The skin ulcerated, and the lower jaw was invaded. Upon this, a large part of the cheek, the lower jaw from the symphysis to the angle and the contents of the submaxillary triangle were removed. The wound healed well.

In sixteen months (April 30, 1889) he was readmitted with a recurrence in the upper set of the deep cervical lymphatic glands. The skin, being infiltrated and ulcerated, was removed by a long incision along the anterior border of the upper part of the sternomastoid muscle, joined by two shorter incisions so as to enclose a triangle. This having been done, the large vessels were defined at the lower part of the wound, when the growth was seen to be adherent to the internal jugular vein and external carotid artery. These vessels were therefore extirpated with the growth. Further, the posterior belly of the digastric muscle lying on the growth, and all the soft structures beneath the growth right up to the mucous membrane of the pharynx, were removed. This included the hypoglossal nerve and a large portion of the constrictor muscles, as well as the greater part of the greater cornu of the hyoid bone. Although the growth extended close to the mucous membrane, the latter was apparently not invaded, so that it was left in order to avoid opening into the pharyngeal cavity. The wound healed up perfectly.

Three and a half months after this (August 15, 1889) he was again readmitted, with a recurrence between the skin and the mucous membrane of the



Base of
Tongue.

Glottis.

Dr. MacCormick's Case of Excision of Wall
of Pharynx

pharynx at the site of the last operation. This time, a preliminary tracheotomy having been performed, the pharynx was plugged with a sponge, and the wall of the pharynx with the growth and skin were freely removed. The ramus of the jaw was disarticulated, so that the naso-pharynx was entered into. Part of the parotid salivary gland, the pillars of the fauces, and the tonsil were removed. Since the growth adhered to the internal carotid artery, this vessel, with about one inch of the common carotid, was removed (the external carotid having gone in the previous operation). The skin was now sutured to the mucous membrane all round, and the marginal wound healed perfectly, so that a large opening remained as is seen in the figures. In the posterior margin of the opening are contained, intact, the vagus, spinal accessory, and sympathetic nerves. In the upper margin of the hole a small recurrence appeared in the parotid; this was removed wide of the growth, and at this time the *pes anserinus* was taken away. By this time the patient had made for himself a sort of pad, kept in position by rubber bands, by wearing which he could speak and swallow comfortably, and evidently suffered but little inconvenience.

Four months after this operation (July 8, 1890) a little movable tumour, about 1 cm. in diameter, appeared about $2\frac{1}{2}$ cm. below the mastoid process at the posterior border of the sterno-mastoid muscle. This was removed by a vertical incision, and at the same time a chain of *glandulæ concatenatæ* for about 5 cm. lower down was dissected out. The spinal accessory nerve was exposed in the dissection, and some of the sterno-mastoid branches divided in the line of the incision; the trunk, however, remained intact. The wound speedily healed. There was no sign of recurrence elsewhere; and this is the last operation. The patient is now apparently free of the disease (*vide* Journal of Anatomy and Physiology, vol. xxvi.)

Two Cases of Acute Purulent Synovitis (knee and ankle),
treated by incision and washing out with Peroxide of
Hydrogen. No drainage. Recovery with perfect joints.

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IN March, 1892, my attention was directed to the use of peroxide of hydrogen in cases of acute suppuration by seeing it recommended in the treatment of abscess of the brain by Senn, in his "Principles of Surgery." Since then I have used it in several cases of acute suppuration, obtaining primary union in all uncomplicated cases. The two cases mentioned below came under my notice soon after this, and I considered that they were just the cases in which one would be thankful to have some means by which to destroy the tendency to suppuration without injuring the tissues. The result in each case was so satisfactory that, notwithstanding my experience in the use of this substance being too limited to allow of any definite conclusion being drawn from it, I feel it my duty to bring the cases before the notice of this section. I am the more especially inclined to do so, as, though I have searched the limited literature at my disposal, I can find, besides the reference in Senn, only one other reference to the use of peroxide of hydrogen in connection with the treatment of suppuration, and that is in the supplement to the *British Medical Journal* of August 22, 1891, where Dr. S. S. Golovin recommends it as an eye lotion in cases of ulcer and purulent inflammation in solutions of from 3 to 15 per cent., and claims good results from its application. He also recommends its being kept in a dark bottle, in a dark place, to prevent decomposition, which can be further guarded against by the addition of sulphuric ether in the proportion of 2 per cent. So far I have been unsuccessful in finding any detailed directions as to its application, though at the end of the notice of Dr. Golovin's paper reference is made to an extract from a paper by Dr. R. Morris appearing in the supplement of November, 1890. On referring to the number of the journal mentioned I can find no trace of Dr. Morris' paper. Under these circumstances, it may not be out of place if I describe fully the method which I have adopted.

In the first place, the skin in the neighbourhood is most thoroughly cleansed, washed with ether, and a compress of $\frac{1}{1000}$ perchloride applied for an hour previous to operating. The hands and instruments are, of course, made as aseptic as possible. Two or more incisions are made into the joint, and the pus allowed to escape. The preparation of the peroxide which I have used is made by Robins, and is in general use as a hair dye, and can be obtained at any druggist's. From half an ounce to an ounce of this is injected with a sterilised syringe into the joint, and allowed to remain in the joint for two minutes, during which brisk effervescence occurs. The joint is then thoroughly washed out, with hot sterilised water flowing through a syphon. The peroxide is again injected, and the joint again washed out with

water. The incisions are then sown up with silk, the part is dusted with sterilised boracic acid, over which a dressing of Hartmann's wood wool tissue impregnated with perchloride is applied, and the limb is kept at rest on a splint for a few days.

Case 1.—J. M.D., *et.*, 9—May 24th, 1892.—Whilst he was crawling on the floor a needle ran into his right knee-joint, eye first. He pulled this out at once. May 31st.—When first seen the joint was very tender, and distended with fluid; temperature, 102. Chloroform having been administered, purulent fluid was removed from the joint with a hypodermic syringe. An incision was made above and below the patella, and the joint treated as described. Some adhesions were found on the inner side of joint. June 1st.—Temperature normal, no tenderness on pressure over joint. June 12th.—Stitches removed; joint appears perfectly normal; splints discontinued; allowed up on crutches. June 24th.—Adhesions in joint broken down under chloroform. June 30th.—Discharged with perfect movement in joints, and a week later I saw him trundling a hoop in the streets.

Case 11.—Mrs. W.—July 18th, 1892.—Ankle joint punctured in front by prong of pitchfork. July 26th.—Joint found distended with fluid, very tender, movement causing intense agony; temperature 102. Under chloroform pus was removed from the joint with a hypodermic needle. Incisions were then made into the joint at the site of puncture, below the inner malleolus and in front of outer malleolus, and the joint was treated as described above, and the limb placed on back splint. August 2nd.—The pain and tenderness in joint disappeared, and the temperature fell after the operation. The stitches were removed, and the leg was taken off the splint; allowed to get up. August 5th.—Left hospital with perfect movement of joint. August 20th.—Can bear whole weight on foot, and walks well.

The Treatment of Chronic Suppuration, without Drainings, by Barker's Method.

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BILLROTH, in his "Clinical Surgery," complains that antiseptic surgery, useful as it is in the treatment of recent wounds, practically fails in the treatment of chronic suppuration, where, though under its influence cases may run an afebrile course, in a large proportion of them a sinus persists in spite of the cavity being kept thoroughly protected from outside infection. Lister has, undoubtedly, obtained brilliant results in these cases, but even in his skilled and painstaking hands the treatment has had to be continued for long periods, during which the accidental exposure of the wound to the outside septic influence has had to be most carefully guarded against. Under these circumstances, all surgeons must regard with very great interest the treatment of these cases without drainage, advocated by Caird in the *Edinburgh Medical Journal* of September, 1890, and Barker in the *British Medical Journal*, at about the same period. They both recommend small incisions and thorough removal of the pyogenic membrane, by scraping with the finger or special instruments; Caird washing out the cavity afterwards with warm boracic lotion, and using a very short drain for the first day, and then closing the incisions; Baker washing out with very large quantities of very hot water, filling the cavity with iodoform emulsion which is squeezed out, and bringing the edges of the incision together with silk sutures without any provision being made for drainage.

In the treatment of the following cases I have followed the plan suggested by Barker, but have extended the treatment to cases which had been under treatment previously by antiseptic drainage, and in which the troublesome sinusses referred to by Billroth were persisting. In the first case it will be noticed that antiseptic drainage and Barker's method were carried out at the same time in the same patient; the result by Barker's method being immeasurably the superior. In the second case the sinus had persisted for fifteen months; in the third case the patient had been careless, and the sinusses were not kept aseptic, besides which there was a communication between the abscess cavity and the bowel. This case was the only one in which complete cure was not obtained, a little discharge from the sinus in the groin, and one over the sacrum, still persisting, though her general health is vastly improved. The fourth case was the only one which could be called an uncomplicated chronic abscess; in the fifth case, besides removing the pyogenic membrane, the head of the femur was removed, and the acetabulum scraped out, with a most satisfactory result.

A third method has been practised for the treatment of these cases, viz., that by aspiration of the liquid contents, and injection of iodoform emulsion. This would not, of course, have been applicable to the cases of sinusses persisting after treatment by antiseptic drainage, nor to the case where the head of the femur was removed, and I cannot see that it has any advantage, except that of easier application, over Barker's plan in which, as long as

strict antiseptic precautions are adopted, the position is practically the same as after aspiration, with the advantage that the pyogenic membrane, and where present the diseased bone, have been removed, as well as the liquid pus. I may state here that the temperature in the cases reported below has kept practically normal, and that the general health in every case began to improve from the dates of the operations. The parts round the seat of operation were thoroughly cleansed, and for some hours before operation kept moist by compresses of perchloride of mercury $\frac{1}{1000}$, and the strictest antiseptic precautions were adopted during the operations. The dressings applied were in the earlier cases cyanide gauze, and in the later ones Hartman's wood wool tissue, impregnated with perchloride, the surface of the skin being first well dusted with sterilised boracic acid.

Case 1.—S.A., 55, Maori.—Admitted to the Wairau Hospital April 22nd, 1891, with a large chronic abscess round upper part of left femur, and another smaller one over outer side of left shoulder. April 23rd.—Both abscesses were treated by incisions and antiseptic drainage. April 29th.—The dressings have had to be changed daily, as the discharge has been so copious, more especially from the abscess round femur which to-day has been scraped out and treated by Barker's method. May 5th.—The incisions in thigh are firmly united. Stitches removed. No sign remaining of the abscess round femur. Antiseptic drainage is still continued with the abscess near shoulder. June 10th.—Sinuses near shoulder still discharging. Edges of incisions excised and sinus treated by Barker's method. June 22nd.—Incision healed, stitches removed. July 6th.—A collection of pus, which had escaped recognition, partly owing to patient's inability to express himself in English, was found in left iliac fossa with the skin reddened over it and threatening to burst. This was incised and treated by Barker's method. July 30th.—The abscess has continued to discharge between the stitches, which, however, have held, and to-day the incision is found to be thoroughly healed.

Case 2.—T.F., 18—Suffering from hip disease. Admitted to Wairau Hospital, August 9th, 1889. Treated by extension and Thomas's splint. March 14th, 1890.—A large abscess in iliac fossa and round hip, treated by incisions and through antiseptic drainage. June 24th.—All the incisions have been healed for some time, except the one in iliac fossa, which shows no tendency to close. The edges of this incision were excised, and the sinus treated by Barker's method. July 20th.—Stitches removed, and edges of incision found firmly united. Sept. 15th, 1892.—Six months later a spot of lupus on outer side of dorsum of foot was excised, and the lad is now in good health, has fair movement at the hip, and can bear his weight on the limb.

Case 3.—M.B., 27, female.—July 31st, 1891.—There is an abscess over sacrum and a sinus opening near anterior superior iliac spine on the right side, the remains of a large abscess treated by incision and antiseptic drainage more than a year previously. There is also a discharge of pus from the bowel. The abscess and sinus which were found to communicate were treated by Barker's method, some dead bone being removed from the sacrum. Aug. 20th.—The incisions over sacrum are healed, and the opening of the sinus nearly closed. Is compelled to leave the hospital on account of urgent business. Jan. 27th, 1892.—Has returned for treatment. Two of the incisions over the sacrum have reopened and are discharging, as also is the sinus in iliac fossa, and she passes a good deal of matter by the bowel. The sinuses were again treated by Barker's method, some small pieces of dead bone being removed at the same time, but again she had to leave the hospital on account of the rather sudden death of her husband before the incisions

were healed. Sept. 15.—Her general health has improved greatly, and she is able to perform her household duties. There has been no discharge of pus from the bowels since the end of February, but the sinns in iliac fossa, and one over the sacrum are still discharging a little. It may be necessary to again treat this case by Barker's method.

Case 4.—M. H. 3, female—Has a large collection of pus under the muscles in the left lumbar region. June 28th, 1892.—A cavity extending from under lower left ribs, which are bare in several places, and down to inside of iliac crest was treated by Barker's method. July 18th.—The child has continued to improve rapidly since the operation, and to-day when the dressing was removed the incisions were found firmly united, no sign of the abscess remaining.

Case 5.—G. B. 8, son of M.B. (Case 3).—August 12th, 1892. Four years ago had hip-joint disease on the right side, apparently cured by rest and extension; symptoms reappeared ten months ago; parents would not consent to treatment; at present there is a large collection of pus round joint, and the head of the femur is dislocated on to the dorsum of the ilium. The head of the femur was re-sected, the anterior incision being employed and through this and two other incisions lower down the thigh the acetabulum was thoroughly cleared out and the cavity treated by Barker's method. August 18th.—Dressing changed for first time; incisions practically healed; stitches removed; a little oozing of clear watery serum appears in the track of some of the stitches; has had no pain since the operation, nor is there any tenderness over the hip. September 15th.—The boy has continued to improve in every way; the right leg is in perfect position and half an inch shorter than the left.

NOTE.—Since completing this paper I have found a report of seven cases of hip disease with abscess brought forward by Barker in the *British Medical Journal* of November 1st, 1890, in which excision was performed and the abscess cavity treated by this method with primary union in all but one, and in this case, which did well otherwise, ordinary pus-producing germs had probably been introduced during a previous aspiration.

I also find that in Treves' "Manual of Operating Surgery" this operation is fully described, the description being taken from a paper by Barker, which appears in the *British Medical Gazette* of January 19th, 1889. I am pleased to have found these two references to the extension of this plan of treatment of chronic abscesses to cases of excision of the hip before bringing this paper before the notice of this meeting, as otherwise I might have been inclined to claim the merit of the novelty of such an extension.

Anchylosis of Lower Jaw.—A Short Record of two cases treated by Excision of the Condyle.

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Lecturer on Surgery, Adelaide University. Hon. Surgeon, Adelaide Hospital.

A. L. B., *æt* 17 years, eleven years ago was kicked in the face by a horse, and since then has had very limited movement of the lower jaw. Health always good. Family history good. The lower jaw is almost immovable. About an inch in front of each angle there is a depression and groove in the bone. The upper teeth project slightly, and the central incisors of the lower jaw are directed inwards. She can only take soft food, has no power of mastication, and pushes her meals between the teeth with her fingers. The incisors can be separated about $\frac{1}{16}$ th of an inch with great difficulty. Under other the lower jaw was depressed nearly half an inch, the screw dilator seeming rather to bend the bone than move the condyle.

After waiting three weeks I cut down upon the right condyle, and found firm bony ankylosis, with down-growth from the base of the zygoma. The neck was divided with the chisel and hammer, and a portion, about one-quarter of an inch across, removed. The dilator was introduced, and the lower jaw depressed with great difficulty about half an inch. The left condyle was evidently ankylosed.

During the following month wedges were inserted and the incisors separated daily about half an inch, the dilatation causing pain in the region of the left condyle. I then cut down on the left side, and removed the neck and part of the condyle in fragments. The patient went home in three weeks with very good movement of the jaw, but a small sinus persisted on the left side. From this I subsequently removed a fragment of loose bone, and had to open a deep-seated abscess above the zygoma.

Case 2.—E. F., *æt* 24. This patient came under notice in February, 1892. She is unable to give a very definite history, but says that after a fever in early childhood an abscess appeared close to her left ear, and that she has not been able to open her mouth since. In childhood her right ear often ached and discharged matter. She cannot open her mouth wide enough to insert the tip of the little finger. The lower jaw is fairly well developed. There are deep old scars over the left masseteric region. The left external auditory meatus is completely closed. The incisors are wanting and many other teeth carious. I found it impossible to depress the maxilla, and, influenced chiefly by the condition of the left ear and the scars over the left ramus, cut down upon and exposed the left condyle. I divided the neck with forceps and removed the head of the bone. There was no gross disease of the bone or joint, and no bony ankylosis. I had cut down upon the wrong side, having been misled by the external evidences of old suppurative disease in the vicinity. Exposing the neck of the right condyle, bony ankylosis was discovered with excessive formation of new bone. The neck

of the condyle was cut through and a large portion removed by the chisel as in the preceding case, and it was also necessary to remove a portion of the over-hanging base of the zygoma. The mouth could now be opened easily and all the decayed teeth were removed. There was some delay in the healing of the wound on the right side, a sinus persisting for several weeks.

My friend and colleague, Dr. W. Anstey Giles, kindly examined the left ear, and, reflecting the auricle forwards, found the meatus completely closed by bony out-growths.

This patient left the hospital with free movement of the maxilla, and is now waiting for a set of artificial teeth.

I am indebted to my friend, Dr. Goldsmith, of Port Wakefield, for the opportunity of treating these cases.

Treatment of Transverse Fracture of the Patella by Subcutaneous Wiring.

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Hon. Surgeon, Melbourne Hospital.

SINCE the impetus given to surgery by the introduction of Listerism, no lesion has, perhaps, received more attention from the hands of the most eminent and accomplished in our art than that of transverse fracture of the patella. The lameness that this injury occasions, the liability of the opposite kneecap to become similarly affected, and the difficulty that has hitherto existed, save in exceptional cases, of procuring union between the severed fragments, have always marked this accident as one of extreme importance.

It was for long, in fact until Sir Joseph Lister opened freely into the knee-joint, a puzzle to surgeons why the separated parts in this fracture could never, by external appliances, be brought sufficiently close together so that osseous attachment could take place. So rare, indeed, was it to find this description of union that many distinguished practitioners (Mr. Samuel Lane amongst the number) declared that such never took place, and that it mattered very little how closely the fragments were approximated, for, if ever they were by some means or other drawn nearly together, the fibrous tissue, which took the place of the osseous callus in other fractures, only stretched the more when the limb was relaxed from the splints and subjected to use. The reason why bony union was so seldom witnessed was attributed, by older surgeons, first, to the ruptured fringes of the dense aponeurosis, which covers the patella, falling into the gap between the fractured ends of the bone. This solution, however, was scarcely a satisfactory one, nor could any reason be given why this peculiarity should be common in fractured patella, and so rare in other fractures. Another reason assigned was that the distention of the joint by fluid, which, of course, always occurs to a more or less degree after the injury, served to keep the parts asunder, and to obviate this, after the introduction of Dieulafoy's instrument, aspiration came to be a constant practice, with, however, no better success, as far as obtaining bony union, than that previously achieved.

Another cause given was the drawing up of the upper fragment by the contraction of the quadriceps, and to this and to the effusion of blood which always takes place, with the clotting between the ends of the broken bone, may be attributed the rarity of apposite and osseous attachment. Still, subcutaneous section of the quadriceps does not seem to be of much utility, neither can the parts be brought together by simply clearing out the joint and sluicing away the clots, a method which requires more careful and complete asepsis than can be generally commanded.

The opinion formerly held, that union by bone in transverse fracture of the patella never took place, is erroneous. I do not attach much importance to the few isolated cases occasionally recorded, as here the field is open to doubt; the surgeon may have been mistaken in the nature of the fracture, the union may be of dense fibrous tissue, and so forth; but it is well known that in those rare cases of longitudinal fracture which are sometimes seen

the union is perfect. Then, again, in the practice of individuals, by one method or another, the histories of this manner of union are becoming daily more frequent. A good illustration of bony union in an oblique fracture was shown, some three years ago, at a meeting of our own medical society. Immediately after the accident the parts, in this case, were distinctly separated, and after their adjustment and retention in place by an ordinary bandage, perfect bony union took place. But I really have no need to select individual cases, as I think it is now generally conceded that there is no reason why, if in a transverse fracture of the patella, the parts can be brought into accurate apposition and so maintained, the usual form of bone union should not take place. The open method, as suggested by Sir Joseph Lister, to my mind entails a most serious operation; one far too hazardous for the nature of the injury. It should only be undertaken by a surgeon daily accustomed to the use of the most perfect antiseptics, and I may say attached to a hospital furnished with all complete modern requirements. To open a large articulation like the knee-joint is really a most serious affair, and if anything should go wrong in the minutest detail, most unhappy consequences are likely to follow. To place the matter on a more homely footing and bring the procedure down to one's own door, I should not myself, if I chanced to meet with this accident, allow any surgeon to perform this operation on me. However, the principle is right, viz., an effort to bring the broken ends of the bone together, and it remains to be seen whether this cannot be attained by a simple and safe plan.

In undertaking any operative procedure in fractured patella, as a rule, the sooner the remedial measures are adopted the better. There are, however, certain conditions when delay is advisable; for instance, if there is much external bruising and œdema, or when there is synovitis with effusion. In the first instance the swelling is subdued by the usual treatment, and in the latter condition the joint is aspirated.

When it has been decided to operate the method that I have adopted for nearly four years is as follows:—The surrounding parts are shaved, thoroughly scrubbed, and made perfectly aseptic. A small incision is made at a point a little more than half an inch above the upper margin of the patella and in a line with its inner edge. A full curved perineal needle is inserted at this opening and thrust downwards and outwards until it encounters the upper fragment, and it is then slid along the bone for about an inch and brought out on the outer side at a point corresponding with the opening on the inner side. When the point of the needle is felt under the skin a small incision with a tenotome will greatly facilitate its exit. The needle is now armed with stout platinum wire (No. 20 wire gauge) and withdrawn, leaving some seven or eight inches of wire protruding from each opening. This first step being completed, a small transverse incision, a quarter of an inch long, is now made about half an inch below the extreme point of the lower fragment of the patella, and an eyed drill, as shown in the illustration, is inserted and worked through the lower fragment in an upward and outward direction. When this portion of the broken bone has been thus obliquely perforated the knee is somewhat flexed so as to bring the upper fragment boldly over the condyles of the femur. The drill is then worked upwards and slightly outwards through this portion of the fractured patella, and when the bone has been traversed the drill is pushed onwards so as to make its exit at the wound on the outer side from which the platinum wire is protruding. The drill is now armed with the wire and withdrawn, leaving the metallic suture through both fragments of the broken patella on the outer side. The drill is again inserted at the lower opening and

pushed upwards and inwards so as to form a V shape with the wire already drawn through the two pieces of the broken bone on the outer side. After the drill has again passed through both fragments it is pushed out at the opening on the inner side, armed with the wire and withdrawn. It will be seen that the wire is through the sides of the fragments and around the greater part of the superior edge of the upper portion of the bone, somewhat in the shape of a horseshoe, and that the two ends of the wire are free at the inferior extremity of the patella. The two separated halves are now carefully approximated, and the wire gradually tightened, caution being used that it does not kink. Considerable force has very often to be used to bring the upper fragment in contact with the lower one. When this has been accomplished and the wire made perfectly taut, the ends are twisted around one another three or four times, cut short, and the twisted end is flattened out and pushed on to the lower margin of the patella. To more effectually tighten the wires and to twist them with little or no trouble, I have used in my recent cases a small wire tightener fashioned after Koeberlé's clamp, but having a fine point with two openings, just sufficiently large to admit the wires. With this instrument there is not the slightest difficulty in approximating the separated parts. Two or three horse-hair sutures are used to close the skin wounds, the parts are dusted with iodoform, antiseptic dressing applied, and the limb carefully adjusted on a posterior splint.

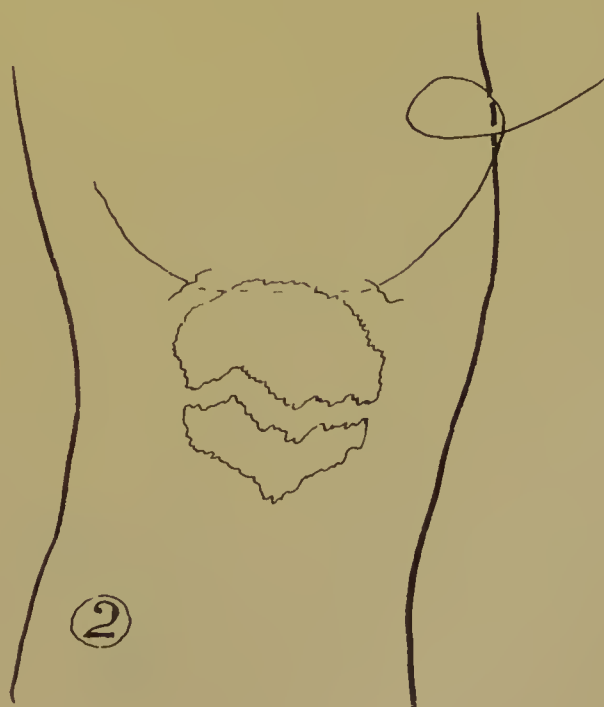
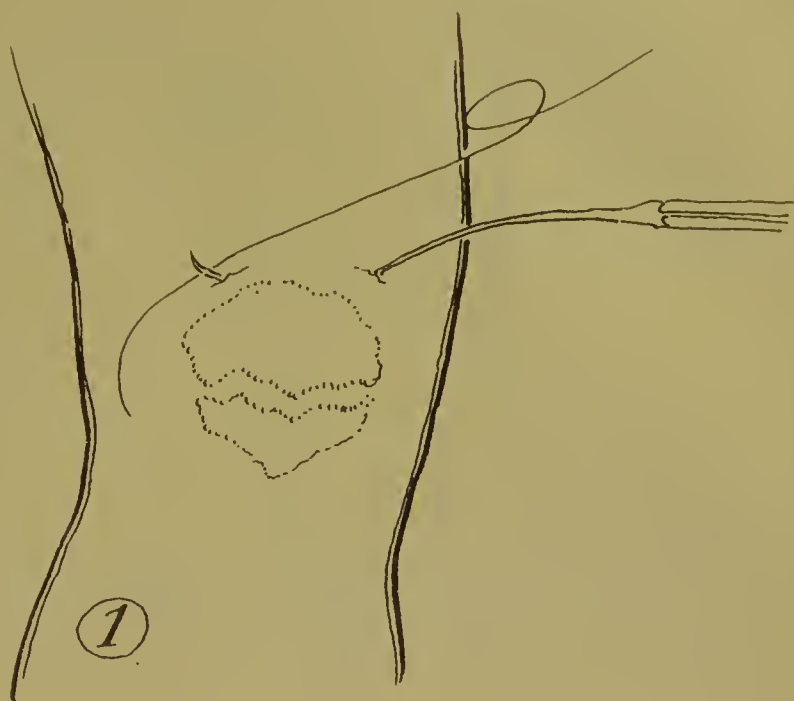
This is the description of the operation, and the results as obtained by myself in the Melbourne Hospital and in private practice are such as to cause me to treat every case, whether young or old, in a similar manner. In my earlier cases, and indeed for some time afterwards, I was in the habit of explaining to the patients that the treatment necessitated a certain amount of risk, which, however, in my opinion, was well worth undertaking, considering that bony union and a perfect joint would probably be the result. For over two years I have now ceased to in any way warn the patients, feeling sure that, with proper precautions, there was not the slightest danger. I have operated by this method on eleven cases at the Melbourne Hospital, the first being on the 16th May, 1889. These cases were exhibited to the students, and were all perfectly successful, and now some of my colleagues have adopted the same line of treatment. Equally good results have followed five similar operations in my private practice, making in all sixteen cases. I will just describe two cases that were operated upon quite recently at the Melbourne Hospital—in the first a good result could hardly be expected, but the second case was a very favourable one for surgical interference. The first patient was a man about 50; he was admitted on the 4th April with a transverse fracture of the patella, but had been drinking heavily and was suffering from alcoholic delirium; there was also considerable bruising of the soft parts with general cedema and synovitis. In this case, of course, I was obliged to wait until the delirium had ceased and the swelling somewhat subsided; I then operated; there was no rise of temperature, and the bone is now as solid as its fellow. The second patient was a young man, *æt.* 21, who was admitted under my care on 31st July suffering from the same lesion; I at once operated, *i.e.*, within a few hours of admission; there was no pain nor rise of temperature, and when I last saw him the line of separation (which, on admission, was about an inch in width) could hardly be detected, in fact the bone was perfectly solid. As a rule the wire is left *in situ*, in fact, there are several of my hospital patients following labourious occupations, the presence of the metallic suture causing no inconvenience. It is only within the last three months that a tram conductor consulted me

with reference to some trivial matters, and afterwards informed me that he could get about his work as usual. I did not remember the man, and failed to understand what he referred to until he explained that I had operated upon him for transverse fracture of the patella.

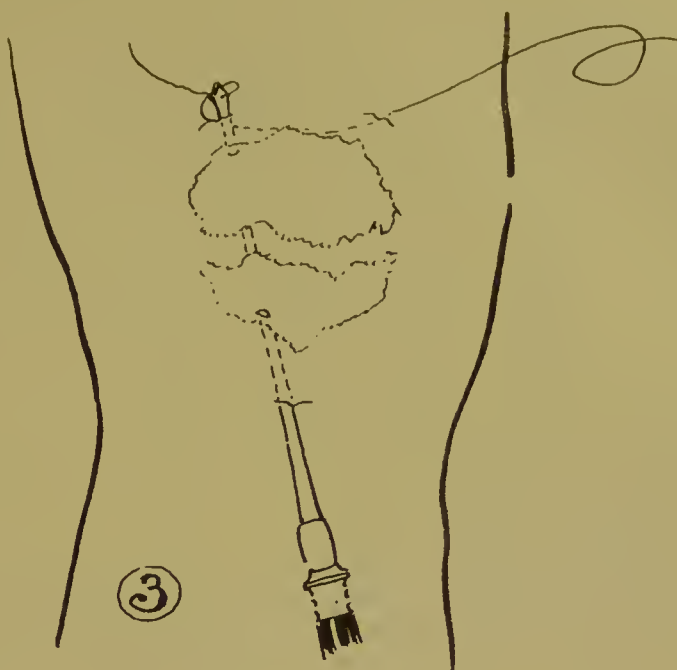
Recently I have had to remove the wires in two cases in consequence of the twisted ends causing irritation. However, in both, bony union was perfect, and artificial support quite unnecessary.

I am well aware that the idea of using some form of suture for transverse fracture of the patella, without an open operation, is not altogether novel. An account of the methods suggested is given in a paper by Mr. A. E. Barker, in the *British Medical Journal* of February 27th, 1892, which also contains a description of a method of permanent subcutaneous suture devised by himself, and since then several modifications of the plan have been suggested.

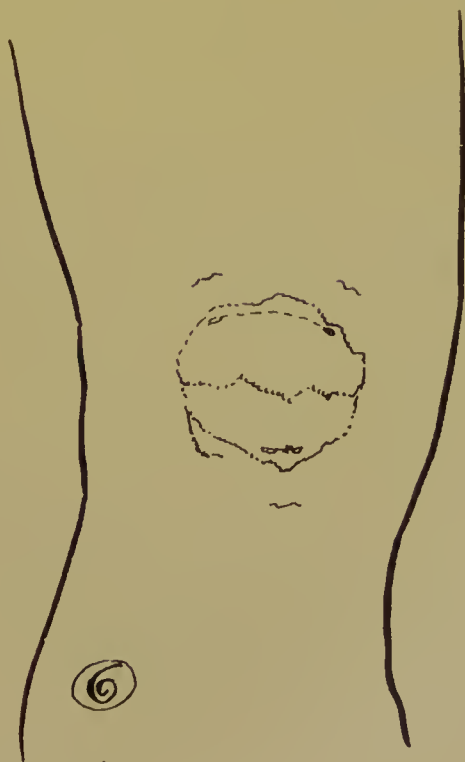
Priority in matters of the kind is not of much moment, but I think it right to mention that my first operation was in January, 1889. I have just been informed that Ceci's paper was published in 1888, but I have never seen it, and my operation differs considerably from his in being less complicated. It is curious that the same ideas should have been independently worked out at opposite ends of the globe.



To illustrate Mr. Fitzgerald's Paper on Subcutaneous wiring of fractured Patella.



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(12-12-93)



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(12 & 12-93.)

Osteotomy for Badly-united Fractures. Notes of Cases, with Remarks on the Operation.

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I WRITE these brief notes with fear and trembling, hearing from the hon. secretary, Dr. Fiaschi, that there is no other paper treating on this matter to be read. I hope, however, my hearers will pardon my boldness in coming forward to deal with so large a subject.

Theoretically, when a long bone is fractured, and it falls to the lot of any ordinary average surgeon to treat, the result is that the union is perfect; and by-and-bye, in many cases, even in dissection, no trace can be found of the break. (*Heath's Dictionary of Surgery*.) Other cases heal more or less well, but a small minority, very small, I am glad to say, result in such a condition that the limb is useless, or practically so. It is to relieve these latter that my subject treats of—

First, as to the causes of vicious union. Pick, in his work on "Fractures," groups them under three heads:—

1. From the fracture being badly set, either through carelessness on the part of the surgeon, or from swelling of the parts, and his inability to reduce the displacement.
2. From displacement taking place after reduction, either from restlessness on the part of the patient, or too loose application of the bandages, the bones slipping out of position, and the accident not being discovered till too late.
3. From yielding of the callus to pressure, or the weight of the body, after the splints have been removed. To this I might add, yielding inside badly-applied plaster of Paris.

The displacements met with are—longitudinal, angular, projection of one of the fragments, and union of contiguous bones; this latter is rare.

If the deformity be slight or recent, and especially angular, it may be corrected by splints, or weights and pulleys, properly applied, but this treatment does not come within the scope of this paper. The various methods of treatment are—Refracture by muscular force, by screw and lever machines, by hammers, by breaking across a bar of wood or iron, by subcutaneous osteotomy, and by osteotomy pure and simple. I shall consider these methods *seriatim*.

If the displacement be angular and recent, and yet the callus too firm to give way to splints, &c., the patient may be anesthetised and the bone refractured by muscular force alone, and replaced in good position. It is impossible to lay down any fixed limits in time for this operation. In *Lancet*, 1870, Mr. Skey reports having broken the femur eleven weeks, and the bones of the forearm seventeen weeks, after the original fracture; I should say this was exceptionally long. The method of breaking by a flat hammer, or across a bar of wood or iron, has merely to be mentioned; it is a most unscientific procedure.

In refracturing by screw and lever instruments, powerful clamps are used, but are dangerous owing to the liability to bruise and otherwise injure the soft parts; on the whole an instrument of this kind would be very expensive, and practically useless as well as dangerous in many cases. Langenbuck, in 1848, is the man who has popularised subcutaneous osteotomy, which is not done very often in these Listerian times; in refracturing large bones it is to a certain extent groping in the dark, I consider.

Key and Sir Astley Cooper, in 1839, were the first to do a regular osteotomy on the tibia, but little was done in this direction for years. We find it mentioned as a formidable operation, and only justified in extreme cases of deformity. Lister operated on a badly united fracture of the tibia and fibula, antiseptically and successfully, in 1870, and since that time osteotomy has been robbed of nearly all its dangers.

The operation consists in cutting down on the spot, having rendered the limb bloodless by Esmark's bandage, separating the faulty union by means of a chisel and wooden mallet, trimming away any of the superfluous callus, if necessary, with chisel and gouge, refreshing the ends of the bone and placing in position. The limb is then put in a splint, and well bandaged above and below; the wound is then dressed antiseptically (of course, the whole operation has been as antiseptic as possible). A day or two after, if all is well, starch or plaster of Paris, preferably the latter, is put over the upper and lower bandages so as to make the limb as rigid as possible, the part where the cutting has been done is left without plaster for convenience in dressing, I prefer this to cutting a window in the plaster, and as the splint is left on, there is no danger of the limb giving in the weak spot, and it is always easily watched. I wait the day or two before putting on the plaster, to be sure of the position of the limb, in certain cases it may be necessary to put up on the table, in others, *e.g.*, refracture of the femur high up, plaster is less likely to do good. I believe in trimming away as much as possible of the masses of callus which one comes across, as long as the soft parts are not damaged. In certain cases a chain saw is a very useful adjunct to the chisel for removal of troublesome callus, angles of bones, &c., which prevent reduction. If the fracture be very oblique and troublesome to keep in position, the fragments may be carefully wired, having previously freshened the opposing surfaces. As to the length of time to be kept in splints, one, of course, must be guided by the way the case progresses, as well as the general time allowed to the treatment of compound fractures, not forgetting the age of patients, too. Strict antiseptic precautions must be carried out, as in compound fractures. I will now give cases illustrating each of the varieties of vicious union.

Case 1.—Displacement after reduction from loose bandaging. This I publish by kind permission of my partner, E. Sheaf, F.R.C.S., Edinburgh, consulting surgeon to the Toowoomba Hospital. Child, *æt.* 15 months, had fallen from door-step and broken femur (L); the club doctor had put up in a long splint for some time, and on removing splint the leg was quite crooked and stunted; Dr. Sheaf operated in May, 1890, I being absent from the colony; an incision was made on the outer side of the thigh, and the bone fractured by means of a chisel and mallet, and placed in good position. I saw the child at the end of June, when there was a very small sinus and thickening round the site of the fracture; the limbs were of equal length. Afterwards a few small fragments of bone were discharged, and the wound healed up; now it is impossible to tell, even by feeling, which was the fractured leg, the only guide being the scar.

Case 2.—Illustrates displacement from fracture being carelessly set. D. M., stockrider, *æt.* 29, thrown from horse and fractured thigh at

junction of middle and upper third; medical man sent for, distance of 12 miles, who set the leg by applying short splints on the inside and outside of the thigh. This treatment was pursued for three weeks, the doctor paying three or four visits. I saw the patient five or six months after the accident; he was unable to get about on crutches without great pain, able to sit down with difficulty, knee very swollen and stiff, enormous mass of callus at site of fracture, shortening some $1\frac{1}{2}$ in. Advised operation, but owing to condition of knee did not care to promise much. On cutting down, found an oblique fracture embedded in a quantity of callus; removed a great deal of this callus and refreshed the ends of the bone; it was next to impossible to keep them in apposition, so drilled and wired and put up in long splint. This was in August, 1891. This case was very troublesome owing to the stiffened knee, a tendency being present to the formation of a false joint at the fracture. However, now—August, 1892—shortening is $\frac{3}{4}$ in., union is rather angular and projecting, it is quite firm, patient is able to get about anywhere with a stick, rides and knocks about after cattle, knee is showing signs of improvement. Though not an absolute success, the man says he is many times better off than he was before.

Case 3.—From yielding of the callus after the splints have been removed. B. S., *æt.* 24, about five months before coming to me, broke both bones of the leg about 3 in. above the ankle; was treated in splints for six weeks, and then in plaster, which was applied without any stiffening pieces of iron, &c.; when this was removed the leg was not quite straight, and since then it has gradually grown more crooked and painful. Six weeks ago operated, and found oblique fracture embedded in callus; operated by two incisions, one for each bone; the fibula was a comparatively easy matter, but I had a great deal of trouble with the tibia; at length managed to replace the bones after removing a quantity of callus. This case was treated by plaster of Paris as described, and the wounds were well in ten days, the man is still in bed on splints, but the position, &c., is perfect.

Case 4.—In the case of projection of one of the fragments, if necessary, this may be cut down upon and sawn off. I had a fracture into the elbow joint, all three bones broken, and the olecranon knocked off; the joint swelled considerably, but by-and-by healed with impaired motion, the olecranon gradually became pulled upward until its fractured edge was almost protruding through the skin. I cut down and sawed it off, and now things are well, arm is very useful, and patient prefers leaving it alone to the risks of excision of the elbow.

These four cases will serve to illustrate each of the varieties of vicious union of fractures, with the treatment adopted. The value of rigid antiseptics cannot be over-estimated in dealing with these cases of refracture of bone; one converts them at once into a compound fracture with all its accompanying dangers. Although these dangers are practically done away with now-a-days, nevertheless, they should not be forgotten, lest, perhaps, one grows careless, and then a day of reckoning will certainly come.

Dislocation of the Acromio-Clavicular Joint.

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DISLOCATION of the scapula from the clavicle, or, as it is more commonly known, dislocation of the outer end of the clavicle, has usually been an unsatisfactory injury both to patient and surgeon. This dislocation, so easy of reduction but so difficult to keep reduced, in spite of the greatest care on the surgeon's part, presents such difficulties in treatment that some have even said it is better to allow the two bones to adhere by fibrous union in their altered position than to attempt it.

In the following remarks I refer only to the commoner form of dislocation at this joint—that, in which the outer end of the clavicle passes above the acromion. In the other very rare form of dislocation in which the acromion passes above the clavicle, if the capsule on the upper surface of the joint be intact, the procedure hereafter proposed would not be required, as fixation of the arm could be maintained by strapping and bandages. Of several instances of the common form of this injury which I have seen I can only recall few which have given successful results when treated by the ordinarily accepted method of fixing the arm as for fractured clavicle and then keeping pressure on the outer end of the clavicle by a pad and strapping passed over the shoulder and round the elbow. This injury is usually caused by a violent blow on the point of the shoulder with direction from above. The anatomical relations to one another of the bones involved must be borne in mind—their small oval articular facets—that of the acromion looking up and in, and that of the clavicle down and out, with a wedge of fibro-cartilage with its base upwards between them. These offer but slight resistance to any force, were it not for the ligaments which have special duties in this joint. The important ones are the strong superior ligament above and the conoid and trapezoid below. In the two cases operated on by me it was the superior ligament that had suffered most, for in both cases this had been torn away from the upper surface of the clavicle, leaving the fibro-cartilage attached to the upper edge of the acromion intact.

Case 1.—In December, 1888, a cab-driver, aged 35, was admitted into the Prince Alfred Hospital with a dislocation at the acromio-clavicular joint from a fall on to the left shoulder. The dislocation was easily reduced, but the parts could not be kept in place. The pressure employed to try and keep the bone in position only resulted in considerably inflaming the skin over the joint. Under the circumstances, I thought it would be possible to wire the parts together and so obtain a useful arm.

Operation.—On December 12th an incision was made 3 inches in length down to the bone, along the anterior border of the clavicle extending out over the top of the acromion. The soft parts and the attachment of the deltoid were dissected off until the finger could be passed under the clavicle inside the conoid and trapezoid ligaments and under the acromion outside them. It was found that the superior ligament had been torn away from its

attachment to the clavicle, leaving the interarticular fibro-cartilage attached to the acromion. The clavicle was drilled through just inside the conoid ligament and a silver-wire passed. This was then carried by means of a curved needle between the trapezoid and conoid ligaments so as to lie close to the under surface of the joint. The acromion was drilled through about $\frac{3}{4}$ inch from its articular facet, but I had great difficulty in bringing the wire up through the hole, as there is very little room to work in. After several attempts to pass the wire crooked up, I thought of passing a fine canula through the drill-hole and then threading the end of the wire into it, and withdrawing the two together, and this succeeded. I can recommend this plan for all cases in which bones are to be wired. The bones were brought into apposition and the wire drawn tightly round them and fastened off. The wound was dressed with sal alembroth gauze and wool, and the shoulders drawn back over a sandbag placed up and down the spine. This procedure kept the parts in good apposition, although drawing the shoulders back over the sandbag had failed previously. The inflamed condition of the skin prevented union by first intention, and for some weeks there was a good deal of discharge from the wound—although a plaster of Paris casing was put over the arm to be sure of absolute immobility. During the whole treatment there was scarcely a rise of temperature. After the plaster was removed, the man left the hospital and continued his occupation of cab-driving, but some months later as the wound kept discharging, and the wire could be plainly felt as the irritating cause, I removed it. The wound healed at once, and he has since never had the least trouble from it. He drove his cab, using that arm freely, until Christmas last, when he fractured his skull; since then he has been confined in Callan Park Asylum, but his arm is perfectly strong and well.

Case 2.—The second case occurred in a very muscular butcher, which I think accounts for the unusual symptoms present. Firstly, the acromion was only drawn half an inch inwards towards the middle line, and Secondly—he could raise his arm above his head with the dislocation unreduced. When the arm was raised the outer end of the clavicle was pushed back under the trapezius muscle halfway between the spine and the acromion, and formed a very marked prominence under that muscle. No bandaging would keep the parts in position for more than a few minutes, and accordingly I recommended operation as in the first case. He would not consent for a week, during which time the muscles began to waste, and he then agreed to the operation. The incision was precisely similar to that of case 1, but the condition of the parts was very interesting. A longitudinal slit had taken place in the superior ligament, which was also partly detached, and the end of the clavicle protruded through this for at least an inch and a half, the periosteum being stripped off it but being in continuation with the ligament. The inferior ligament was torn away from its attachment to the under surface of the acromion, so that the ends of the two bones, together with the interarticular fibro-cartilage which remained attached above to the upper surface of the acromion, and to the periosteum and ligaments which had been torn from the under surface of the clavicle, formed something like the capital N. This separation of the clavicle from the ligaments and the freedom of the interarticular cartilage allowed of the extreme displacement of the end of the bone when the arm was raised. The marked development of the back muscles prevented the point of the acromion being drawn inwards by the pectoralis minor. The two bones were drilled exactly as in the previous case, and the wire passed from bone to bone at first, without passing between the ligaments. On drawing the wire taut I saw that it

would cut through the trapezoid ligament in a few days by pressure. Accordingly I withdrew one end, and passed the wire through between the ligaments on a curved needle, and then up through the acromion again by means of the canula. It only requires about $\frac{1}{2}$ to $\frac{3}{4}$ inch of the bent wire to be passed into the canula to enable one to draw the wire through by withdrawing the canula. In this case, owing to the soft parts not having been damaged by prolonged pressure, I obtained union by first intention—the shoulders being drawn over the sandbag as in the previous case. In three weeks the man was able to be up and about with the upper arm bandaged to his side.

In the *British Medical Journal*, April 16th, 1892, Dr. W. Aitken has proposed a method somewhat similar to mine, but which may be termed a sub-cutaneous one. This I have not tried, but from my experience in case 2, in which all the parts were exposed before me, one serious objection will be found in the fact that the wire passed according to his directions must be outside the trapezoid ligament, and not between the two ligaments. If there be any tendency afterwards to displacement the under part of the wire will be drawn very tight and the trapezoid ligament will be cut through, as would clearly have happened in my case had not the wire been withdrawn and passed afresh between the ligaments.

So far the operation has given me every cause for satisfaction, and although the number of cases operated on is but small, I can confidently recommend it as one which will be a help in overcoming one of the present troubles in surgical practice, viz., when the dislocation is very pronounced, or when there is an uncontrollable difficulty in keeping the bones in apposition. It would be well however for anyone who may be tempted to follow my example, to wait a week or so without any pressure on the skin before operation, to enable it to recover from the effects of attempts made to retain the parts in apposition by bandaging before operating.

Recent Fractures of the Patella

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OF the various methods of dealing with fractured patella, that which appears to me to be the simplest, and to most nearly fulfil the requirements laid down by Mr. Barker in his recent lecture, is one which, if it has been performed, has not been made known. I, therefore, wish to bring before the Congress the results of this one which I have recently employed. In the *British Medical Journal*, April 30th, 1892, Mr. H. A. Butcher proposed passing a wire round the two fragments outside the joint. Eighteen months previously I had already operated by that method, and have since repeated it.

First Case.—The notes of the first case are as follows:—On November 24th, 1890, when out driving, a young married woman was thrown out of the trap, striking her left patella against the edge of the kerbstone. When brought to the hospital she had a wound in the skin $1\frac{1}{2}$ inch long across the patella, with transverse fracture of the bone, a small portion being also broken off the lower fragment on the inner side.

Instead of drilling the fragments and wiring them in that way, I used a large perineum needle on a handle, and passed the wire outside the joint. The point of the needle, unarmed, was entered through the wound on the outer side of the upper fragment, and passed round it, keeping as close to the bone as possible. The quadriceps tendon was traversed from side to side, and the point of the needle brought out at the angle of the skin wound on the inner side of the joint. It was then threaded with silver-wire and withdrawn, the wire thus surrounding the upper fragment. The lower fragment was then dealt with in a similar manner, the ligamentum patellæ being pierced from side to side, and the point again brought out at the inner angle of the skin wound. The needle was then threaded with the other end of the silver-wire and withdrawn, thus leaving the wire all round the two fragments. The joint was well cleansed, all blood clot washed out, and the detached portion of bone removed. The two fragments were pressed firmly together, and the wire drawn very tight and twisted and the end cut off, the knot being hammered down to the side of the upper fragment. There was a slight tendency in the pieces to lift up in the line of fracture from the wire being drawn so tight, but this was overcome by a little pressure from the dressings. The skin wound was closed with horsehair sutures, no drainage tube being used. The wound was dressed with salicylic wool, and the leg put up on a McIntyre's splint and slung at an angle of 60° . There was scarcely a rise of temperature throughout the after treatment, the patient leaving the hospital on January 21st, 1891, with the leg in plaster.

She returned in a month and had the plaster removed, but never showed herself to me until I wrote to her in May, 1892. She came to see me then, that is eighteen months after the operation, when, to my regret, I found the leg perfectly straight and absolutely stiff, but the line of fracture in the patella could not be detected. Very disappointed at finding this stiffness I began trying to move it, but had scarcely any success, although I used a good deal of force. On January 7th I determined to try and bend it under chloroform as I felt the union of the fragments so good, and I knew the patella was further supported by the wire encircling it. I had to use nearly all my power to bend it over my own knee, when the adhesions gave way with

a great "scrunch," but the patella remained intact, thus showing, at least, how satisfactory the union was. Since then I have kept up passive motion, with the result that she can bend the knee to a right angle and walk upstairs.

Second Case.—A young man, D. F., fractured his patella April 14th, 1892. The knee was put up on a splint by his own medical attendant, and the fragments were drawn together by plaster in the usual way, but after two months' treatment there was a separation of about an inch, with fibrous union. He then went to Melbourne to have the fragments wired, but operation was not advised. He slipped on August 18th and again tore the pieces asunder. When admitted to the Prince Alfred Hospital there was some effusion into the joint and the skin was œdematous. The swelling was allowed to go down, and then the pieces were wired together as in the previous case. This was a specially interesting case, because, the lower fragment being so small, it did not permit of freshening the edge of the bone, and so allowing the bone to be drilled in the usual way, and, therefore, it was one eminently suited for the present method. The operation was done on August 31st, and all support was taken off on September 9th, and the patient advised to bend the knee gently. Temperature throughout was normal.

The operation is really a modification of Kocher's, but the wire is completely subcutaneous. There are one or two points that are worth mentioning in performing it:—Firstly—the needle. Although I did both these with a full curved perinæum needle I found it a little short, and also that the point in passing round the last quarter of bone tended to spring away from it, so that I have had a needle made half an inch longer continuing the same circle, which tends to bring the point a little inwards and thus allow for the spring in the steel. The eye is also large enough to take thick wire. Secondly—the needle must be entered opposite the widest part of the patella, or there is a difficulty in keeping it close enough to the bone. Thirdly—the wire should be nearly pure silver, that there may be no fear of its breaking on being twisted up. Fourthly—keep clear of the deeper layers of the skin by passing needle well through the ligamentum patella and the tendon. If this be not done the wire may slip forward over the front of the bone.

Mr. Barker gives three essentials necessary for operations for recent fractures. This operation meets his three requirements as nearly as possible:—

1. *As to infection of the joint.*—This should be perfectly safe as far as any operation can be, for the wire is carried outside the joint capsule, whilst in his own operation the joint is pierced.
2. *Subsequent separation of fragments.*—The force I used in case 1 was vastly greater than any ordinary force applied to a leg, and yet the union remained perfect; so that the unfortunate occurrence of the stiffness has enabled me to be certain on this point.
3. *Residual stiffness.*—In case 1 no doubt there has been great stiffness, but that has been largely due to the patient not coming to show her leg as she was directed. So well satisfied am I now with the firmness of the union, and the way the fragments are held together by the wire, that I should not hesitate to start passive movement very early in another case.

On the other hand, there is no interference with the movements of the joint; the knot lies outside and not to be knelt on. If there be but little effusion, as in instances of fracture by muscular action, the joint need not be interfered with at all, and the whole operation takes but a few minutes.

Of course, as in all these operations, if the joint be full of blood that must be drawn off by the aspirator before the wire is passed.

On the Treatment of Webbed Fingers with new Splint.

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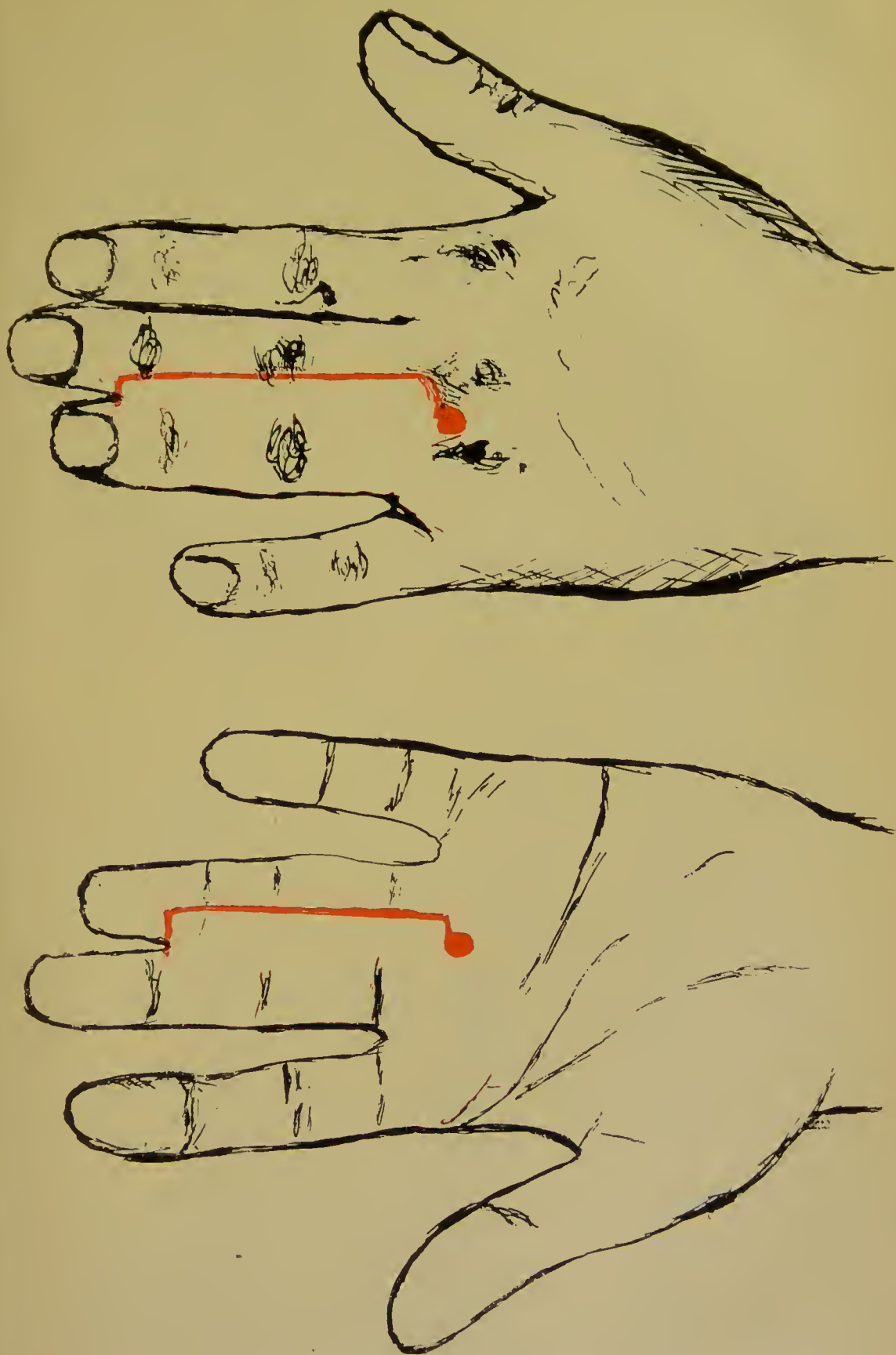
THE successful treatment of webbed fingers by operative measures has always been a difficult matter owing to an extraordinary tendency to the re-establishment of the *statu quo*, even after the concerned fingers have been apparently well separated, and the wounds have apparently well healed. Many operations have been devised with a view of combatting this tendency; you may try anyone of them and assuredly, unless you take certain precautions, you will fail in establishing a lasting separation of the fingers. It is the object of this paper to indicate what these precautions are, as well as to bring before your notice a new splint of my own devising, which in my hands has certainly ensured good results.

We will suppose that this diagram represents a case of webbing between the ring and middle fingers of the right hand. The first care must be to establish an epidermis lined-hole half an inch higher up than the webbing between the other fingers, in this position (*see* diagram). For this hole, when properly formed, is half the battle. Get a hole here well lined by epidermis, and you defeat the great source of failure, *i.e.*, healing-up from the proximal end of your wound. This orifice I make with a little silver instrument exactly as the lobes of ears are pierced for earrings.

Now comes one of the precautions—a precaution of time. In books you will find, if you look the subject up, that this hole should be made some weeks before the actual operation. Substitute months for weeks, and you will be nearer the mark, but still short of it. Be on the safe side and make your orifice eight months before you operate. Keep your rod in for three months; remove it for a week, and see how difficult it may be to replace it. Eight months is not a day too long. Towards the end of this period you may safely remove your rod for some days; but if there is any difficulty in replacing it defer the operation till there is absolute certainty of an epidermis-lined hole. I always place the patient's hand in a splint while the rod is in, for obvious reasons. You want rest, and the splint gives it. Needless also to say that I sterilise my instruments, and use antiseptics to the full. The patients, I may incidentally mention, are always children.

As regards the operation itself, the one I propose is shown in the diagram. It strikes me as being as good as any other; better than many; Norton's, for instance. I have never tried Norton's procedure, but I *have* operated on two relapsed cases after his method had been used and had failed, and therefore I think I may say that I am not prepossessed in favour of his operation. Didot's is, as I have just said, in my opinion preferable to others. You make your flaps very carefully and then stitch them into their proper positions with horse hair. Whether you use the continuous or the interrupted suture does not matter two raps. I have used both with the same success. I certainly myself prefer the continuous suture as it is quicker, and I fancy brings the edges together more evenly. But primary union is certain to ensue whatever sutures you use, provided, of course, that your antiseptics are above suspicion. And now I must bring before your notice

the splint on which I place the hand after operation. Here it is. (*See diagram.*) It may be surprising to hear that even after your epidermis lined hole exists, further precautions are necessary to prevent closing at the webbed ends of the fingers. Let me tell you that within a year after everything has healed there will be a growth of the webbing to the extent of half an inch—precisely the amount I allow for by making my puncture with the silver instrument where I marked on the diagram. And this will occur even with such continuous pressure against such growth as you obtain by this piece of rubber cord. I always made the children on whom I had operated use this splint for at least nine months or a year after the operation at night; day and night for the first six weeks; night alone after that. Children of too young age, that is, before they have reached the sixth year, had better not be operated on. Their hands are so small that it becomes difficult to fix them on a splint so immovably that the silver rod passed through the webbing may not set up undue irritation and possibly, if your antiseptic fail, suppuration.



To illustrate Dr. Roessel's paper on Webbed Fingers.



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To illustrate Dr. Roedel's paper on Webbed Fingers,

The Nature and Treatment of Ganglia.

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EVERY surgeon is aware that the term ganglion has been, and still is, used to designate affections presenting very different clinical and pathological characters, the only common character justifying so loose a nomenclature being that of an apparently cystic swelling in apparent connection with tendon sheaths. It has been recognised for a very long time that marked differences existed between the affections called ganglia, and the difference has been expressed by English surgeons by a division into simple and compound. Since about 1876 it has been stated that these two forms really represented two distinct diseases, and many competent observers, more especially in France and Germany, have maintained that compound ganglion was a tubercular synovitis of the tendon sheath, especially when associated with the formation of so-called melon-seed or rice-grain bodies. Some recent writers have further subdivided this tubercular affection into circumscribed, diffuse, solid, and hygromatous. Still, much confusion and uncertainty exists concerning the mode of origin, classification, and best mode of treating all the different forms of the affection commonly called ganglia. For the last five years one of us (G.A.S.) being dissatisfied with the time-honored methods of treating these swellings, such as a blow with the family bible, subcutaneous section, seton, and incision, has attempted to obtain a radical cure by dissecting out the cyst, and in doing so has, as far as possible, noted the anatomical relations of the lesion. Sections of the removed portions have been subsequently made, and examined microscopically (by T.C.). Some preliminary observations concerning the treatment and probable nature of ganglia were made in 1890, in a paper read before the Victorian branch of the British Medical Association,* when it was stated that further investigations would be made, and the results placed before this meeting of the Intercolonial Medical Congress. Quite recently, and since this paper was commenced, an article entitled "Ganglion and teno-vaginitis tuberculosa," has been published by Charles Seth Evans, M.D.,† giving a very full resumé of the literature of the subject. By referring those interested in the historical aspect of the question to this paper, we can materially shorten the present communication, merely noting the following omissions from Dr. Evans' resumé:—"Nature tuberculeuse des hygromas et des synovites tendineuses à grains riziformes." Par MM. Nicaise, Poulet, et Vaillard.‡ "The pathology of ganglion," by Mr. W. G. Spencer,§ and an interesting account of tubercular synovitis of tendon sheaths in Senn's "Surgical Bacteriology." ||

Leaving out of consideration, for the present, all preconceived theories, let us now proceed to the results of our investigations, premising that they are not to be regarded as conclusive, but rather as suggestive, and indicating the lines of further inquiry.

* *Australian Medical Journal*, Dec. 15, 1890, "Notes among out-patients." G. A. Syme, p. 560.

† *American Journal of the Medical Sciences*, June and July, 1892, p.p. 643 and 38.

‡ *Rev. de Chirurg.*, Aug. 1885, p. 609.

§ *British Medical Journal*, April 25, 1891, p. 903.

|| "Surgical Bacteriology." N. Senn, M.D.

An examination of our specimens has enabled us to arrange them, to a certain degree, in groups showing a gradation (in their microscopic character and, to some extent, in their clinical history) from the simplest cyst to the most complex tubercular growth. The two groups consist of (I) cysts attached to tendou sheaths or joint capsule, commencing in the outer portion of the sheath or capsule, and not communicating with the interior, or what are called simple ganglia, and (II) cysts formed of the whole wall of the tendou sheath, commencing chiefly in the inner part. This form may be due to simple inflammation or tubercular infiltration, and is commonly called compound ganglion. Let us begin with the simplest form, well illustrated by these three cases and specimens:—

Case 1.—A young married woman, after some unusually heavy washing, noticed a little pain and sense of weakness in the right wrist, over which a small swelling gradually formed and has existed for about a year. Rather below the level of the wrist, over the common extensor tendon of the middle finger, is a slightly movable, semi-fluctuant and semi-translucent swelling, the size of an almond. This was dissected completely out (under cocaine, and with antiseptic precautions), and found to be attached by a broadish pedicle to the sheath of the tendon, but it could be easily removed without opening the sheath. The wound healed by first intention, and no inconvenience followed, the sense of weakness being gone. The cyst contained the yellowish, semi-gelatinous, colloidal matter typical of simple ganglia. Sections of the wall (Fig. 1, a. and b.), under the microscope, show that it is composed of rather dense layers of white fibrous and yellow elastic tissue. Among the fibres are seen lines of elongated cells with well-marked nuclei, and long narrow clefts. These are frequently associated, the nucleated cells being found at the ends of the clefts. The cavity of the ganglion presents some recesses, the ends of which also show similar lines of cells, suggesting that the cyst has been formed by the opening up of similar cleft-like spaces. Blood-vessels are not very numerous. Some have well-defined walls, but in other cases it is difficult to decide whether an opening in the tissue is a blood-vessel with imperfect walls, or one of the above-mentioned cell-lined clefts. Scattered through the wall are also small irregular areas, densely infiltrated with small round cells. These are usually found close to the blood-vessels; in other cases the lines of cells may be traced from them, but the arrangement is nowhere suggestive of tubercle, and no giant-cells can be detected. There is no layer of small cells in the inner surface of the wall next to the cavity of the cyst, which is bounded directly by fibrous tissue.

Case 2.—A middle-aged man has noticed a small swelling on the outer side of his right knee for two or three months. Has not injured the limb and cannot account for the condition. The swelling is situated just above the head of the fibula, is the size of a small almond, and feels very firm. Dissected out under cocaine, the cyst was found to be attached to the sheath of the biceps tendon, but was easily dissected off without opening the sheath or exposing the tendon. The wound healed by first intention and the condition gave no further trouble. The cyst contained the typical colloidal material found in simple ganglia. Microscopically the wall of this ganglion (Fig. 2) is very similar to that first described. Blood-vessels, however, are much more numerous and they are often surrounded by irregular collections of small round cells. The cavity appears to be formed by the opening up of cell-lined clefts in the fibrous tissue, and the innermost layer of the wall is more richly cellular than in the last example. No giant-cells or other appearance of tubercle are to be found in this section.

Case 3.—A girl has had a weakness of the wrist and a small swelling on its back for about a year. Dissected out the swelling was found to be a cyst attached to the common extensor tendon sheath. The sheath was not opened. The contents were of the usual colloidal character. Under the microscope a section of the wall shows a dense and fairly uniform infiltration with small round cells. Blood-vessels are very numerous. There is comparatively little fibrous tissue, and the wall cannot be differentiated into layers.

Now take a case, clinically, almost exactly similar to those.

Case 4.—A lady, aged 55, accustomed to work a good deal in her garden, has had for two and a half years a small swelling on the outer aspect of the left wrist, which she feels to be weak. It appeared suddenly after lifting a piano. She was seen in consultation with Dr. Lillies who had diagnosed the swelling as a ganglion and had treated it on several occasions by rupture, tapping, and by seton, but without permanent success. The swelling was about the size of a bean, semi-fluctuant, and situated close to the radial artery, between the tendons of the extensor secundi internodii pollicis and the extensor ossis metacarpi. As it appeared to be deeply attached, it was dissected out under chloroform. It was easily separated from the thumb tendons, and also from the extensor carpi radialis longior, by the side of which it passed, and was found to be attached to the capsule of the wrist joint. The radial artery lay almost over part of the cyst. The ligament becoming bad, the pedicle was ligatured and the cyst removed as quickly as possible, without ascertaining whether it actually communicated with the joint. The wound was closed with deep and superficial catgut sutures, and healed by first intention. The patient has had no trouble since. The cyst contained the typical colloidal substance, and a section of it shows microscopically the usual arrangement of fibrous and elastic tissue with small round cells in lines and nodules; also cell-lined clefts. The fibrous tissue is more open; it contains many vessels, and encloses areas of fat. The small cell infiltration round a blood-vessel lying in the adipose tissue is shown in Fig. 3.

This form, apparently a simple ganglion of the tendon sheath, but really attached to the joint capsule, appears to be not uncommon. Here is a specimen, removed from a dissecting-room subject, almost exactly similar to the case (4) just recorded. Before it was dissected out the cyst appeared to be a ganglion, the size of a small bean, attached to the tendon sheath of the flexor carpi radialis, but, as you see, really springs from the wrist capsule, with which it does not communicate. It contained the usual colloidal substance. Mr. Pick* records a somewhat similar case, also removed from a dissecting-room subject, but communicating with the joint. Falkson† records thirteen cases in which the tumour reached to and was connected with the wrist capsule, and in eleven there was no communication with the joint. Hæftmant‡ has collected eight cases, six of which extended to the wrist joint, but did not communicate with its cavity.

Now, let us consider for a moment a slightly different condition in the next case:—

Case 5.—A boy of 12 has a swelling the size of a walnut on the outer aspect of the dorsum of the left foot. It began as a painful swelling some weeks ago, and was attributed to the pressure of a badly-fitting boot. It is semi-fluctuant, but not near any tendon. Dissected out under cocaine, it was found to be a cyst loosely attached to the fibrous connective tissue over the foot, and quite unconnected with tendon sheath or joint capsule. It con-

* Trans. Path. Soc., Lond., 1867, xviii, 274.

† Evans, *loc. cit.*

tained a clear synovia-like fluid, not so thick or colloidal as that in a typical simple ganglion. On section, the wall of this simple bursa is found to consist of dense layers of white fibrous and yellow elastic tissue, similar to the ganglia already described. It is very vascular, and the margin of the cavity is highly cellular. Between the vessels and cells the fibrous tissue may be made out. Cleft-lined spaces exist, often lined with cells. In various parts areas of small cell infiltration are found surrounding the vessels. One of the largest of these areas is shown in Fig. 4.

Here, then, we have examples of three forms of cyst, resembling one another clinically, all situated on parts of the body freely mobile, and exposed to pressure, almost identical in the microscopic characters of their walls, but all three differing in the anatomical tissue from which they appear to spring—one being from the connective tissue, one from tendon sheath, and one from joint capsule, and the first differing from the other two also in the character of its contents. The tissues from which all three spring are, however, closely allied, the tendon sheath and joint capsule being practically identical.

The descriptions given in most text-books of the histological characters of both joint capsules and tendon sheaths are not very full or definite, and we have made a number of sections of normal tendon sheaths for the purpose of comparing the normal condition with the pathological one. Examining these sections (Figs. 16 and 17) we find that the sheath consists in the main of concentric layers of white fibrous tissue, with occasional yellow elastic fibres. Between the layers are lines of connective tissue cells, and spaces also exist. These are not cell-lined. In some sections a layer of connective tissue cells lines the fibrous wall on its inner aspect (towards the cavity of the sheath), and it seems possible in some cases to trace a line of cells from this to a collection of cells in the wall. Whether this condition is that described by Gosselin as *follicule synovipaire*, we are unable to say.

According to Evans, Gosselin described ectases or pouches of the synovial, cellular, inner portion of the wall into the fibrous substance, and to the occlusion of these he attributes the occurrence of simple ganglia. It may be noted that when, in process of mounting, the spaces in the fibrous sheath become opened up, this frequently occurs along one of the linear collections of cells. In short there is a strong resemblance between the histological appearances of all the three forms of cyst described, and the normal tendon sheath, the pathological specimen presenting much greater vascularity, a greater predominance of elastic tissue, and a much greater cellular infiltration, the cells being curiously massed together, generally around the vessels, and all showing as a marked peculiarity the presence of clefts or spaces between the fibres, cell-lined in the pathological condition. The appearances are strongly suggestive of a very slow and chronic inflammatory process occurring in the outer or fibrous part of the sheath or joint capsule, and the condition might very well be explained by exudation occurring into the natural clefts or spaces, which become dilated, coalesce, and so form the cavity of the cyst. This, in fact, was the explanation of the process originally given by Virchow.* While this mode of origin would explain the formation of the forms of cysts connected with tendon sheaths and joint capsules, and is the one generally accepted in the case of adventitious bursæ, it does not account for the peculiar character of the fluid in the case of the former. Hence another explanation of these forms, to which the term ganglia should be restricted, is that these follicles *synovipaires*

* Evans *loc. cit.* gives original reference *Die Krankh. Geschwülst.* Pt. i, 200.

of Gosselin, alleged to be present in both structures, but, of course, not present in connective tissue, become occluded at their orifice, and so form retention cysts within the wall of the sheath or capsule, and as they become more and more distended, bud out from its outer surface. This seems a very plausible explanation, but our investigations give no positive evidence of its occurrence, nor, indeed, have we satisfactorily demonstrated the existence of the follicles in the sheaths. The mode of distribution of the cellular infiltration in nodules and clumps is certainly suggestive of some specific irritant, but we have failed to detect any sign of micro-organisms in our specimens of this form, although a very patient search with various staining methods was made. On the other hand, a history of traumatic origin in cases of simple ganglion is very generally obtainable, as in case 4, and well illustrated in the following two cases. (6) A gentleman, aged 42, while boxing received a blow on the back of the left wrist. Next day he noticed a little pain and tenderness which passed off, but a slight thickening or swelling remained, which has gradually increased in size to that of a bean. He is certain no swelling existed over the wrist before the blow. While manipulating the cyst, which was over the extensor communis digitorum tendon, it was ruptured, so that its exact attachments and nature were not ascertained, but clinically it was a typical simple ganglion. Case (7) was that of a boy of 12, with a typical simple ganglion over the tendon of the tibialis anticus as it passes over the dorsum of the foot. When a baby he had been operated on for talipes varus and has worn a boot and side-irons until recently. His mother refused to allow it to be dissected out, so it was ruptured with the thumb. Mr. W. G. Spencer (*loc. cit.*) maintains that many ganglia are "produced by a shutting off of a portion of the tendon sheath by inflammation, so that the tendon forms part of the wall of the ganglion," and he says that this inflammation in most cases is traumatic in origin. In only one case (8) of apparently simple ganglion operated on in our series was this condition a probable one. It was that of a young woman with a small ganglion on the extensor tendon of the middle finger, which had apparently been preceded by some teno-synovitis, as evidenced by pain, and ascribed to some overstrain of the muscles. On dissecting the cyst out, the tendon was exposed lying under its cavity, or rather apparently forming its posterior wall. Unfortunately the specimen was accidentally thrown away and was not examined to see whether it presented any histological differences from the more ordinary form. Here, too, is a specimen, removed from an operative surgery subject in which there is obviously a localised effusion within the sheath of the extensor tendons, probably of rheumatic character, as all the joints were more or less in a condition of chronic rheumatoid arthritis, but it could hardly be called a simple ganglion. The following case (9) was somewhat similar clinically, and is interesting as showing the influence of overstrain in a tubercular subject. A young lady of 22 (seen in consultation with Dr. A. J. Wood) has been engaged in type writing for four years, working at the machine often from 9 a.m. to 6 p.m. Six months ago noticed weakness and swelling over the back of the right hand, and six weeks afterwards the left hand became similarly affected. Now, on both hands, the sheaths of the extensor tendons of the index, middle, and ring fingers are evidently distended with some fluid and also thickened. When 13 she had inflammation of the lung, and has spat blood occasionally since. She is losing weight and is very anæmic, but presents no physical signs in the lungs. Her father and two cousins died of phthisis. Operative interference was not advised in her present state of health. This case, however, could not be called a simple ganglion, and was probably one of commencing tubercular synovitis.

of the tendon sheaths, and will go on no doubt to what is commonly called compound ganglion—or our second group now to be considered. The following case (10), seen in consultation with Dr. Hooper, is an excellent example of one form—the tubercular. A healthy looking country girl of 18, has a swelling over the wrist, extending to the palm, and one over the middle of the middle finger. The swellings cause great stiffness of the fingers, which are slightly flexed. They began about five years ago and have slowly increased. She is not aware of having injured the hand in any way. The main swelling occupies exactly the position of the carpal bursa, extending up the arm about an inch and under the anterior annular ligament into the palm. Fluctuation is obtained, and also a grating sensation. The swelling on the finger is firmer and more elastic. No history of tubercular disease in the family, or other evidence of it in the patient could be obtained. Both swellings were dissected out under chloroform; the annular ligament being freely divided. The main cyst was formed of the greatly thickened wall of the carpal synovial sheath of the flexors of the fingers, and contained clear synovia-like fluid and a great number of melon-seed bodies. The tendons themselves were covered in places with a reddish gelatinous growth, and some of the loose bodies were attached to the tendons. The swelling on the finger was quite distinct, the space between the thickened lining of the sheath and the tendon being filled with a soft gelatinous tissue, adherent to both sheath and tendon. All the diseased tissue was removed with scissors, and the tendons scraped clean with a Volkman's spoon. The wounds healed by first intention, and very good movement of the fingers resulted. Sections of the wall of the main swelling show the following appearances:—The fibrous wall is divided into two well-marked layers, the outer of which is looser in texture than in most of our specimens of ganglia, and the inner is uniformly infiltrated with small round cells. Typical tubercular nodules, with giant cells and bacilli are scattered through both layers—some of them are commencing to caseate (Fig. 7). Blood-vessels are fairly numerous. A year and three months afterwards she returned. The middle finger was semiflexed and its tendon hard and nodular, while a large fluctuant swelling occupied the sheath of the flexor longus pollicis muscle in the palm, which was apparently unaffected at the time of operation.

The condition of the sheath of the flexor on the middle finger in this case may be compared with that in the next case (11). A man, aged 34, has noticed a stiffness in the right index finger for about twelve months, when a swelling began to form on the palm just at the base of the index finger, and in a few weeks extended down the finger to about its middle. He is a chemist, and attributes the trouble to using the pestle a great deal. In the palm of the right hand, at the base of the index finger, is a swelling extending down the finger about an inch. The swelling is not attached to the skin, is movable laterally, and feels solid but elastic. The finger itself is wasted and flexion much impaired. An incision was made down to the swelling, which occupied the tendon sheath, and consisted of a solid, reddish, gelatinous mass glueing the tendon to the sheath. It was dissected out and the tendon and sheath thoroughly scraped; deep catgut suture used to stitch the edges of the sheath. The wound healed by first intention and very good movement resulted, though full flexion caused some dragging on the scar. He returned in about nine months with signs and symptoms of tubercular consolidation of the apex of the right lung, and about eighteen months afterwards with tubercular disease of the right shoulder joint. The structures removed were stained and examined for tubercle bacilli, but none were found, though the sections had histologically a tubercular character.

Case 12 is somewhat similar, but occurring in a child $2\frac{1}{2}$ years old, and more acute. The right index finger was jammed in a door two months ago. Now has a pulpy swelling occupying the sheath of the flexor tendons. Incised and soft granulation tissue scraped away from sheath and tendons. The wound healed by first intention, but in two months the condition had recurred. Under the microscope the removed tissue consists of a collection of miliary tubercles, lying in a fairly vascular fibrous matrix. The vessels are mostly of small size, many of them being occluded. The matrix is thickly infiltrated with small round cells. Giant cells are abundant, but no bacilli could be detected. Here is a section taken from a case (13) of compound ganglion affecting the extensor tendons on the back of the wrist, and extending into the carpus of a typically strumous girl, with Pott's disease of the spine. The cyst was formed by the sheath of the tendons, greatly thickened, and contained melon seeds. Under the microscope we see a typically tubercular structure, with a general round cell infiltration of the surrounding parts. Giant cells are abundant and blood vessels numerous. The fibrous portion of the sheath shows a tendency to open up into cell-lined spaces similar to those described in simple ganglion (Fig. 8).

Here then we have undoubted evidence that one form of so-called compound ganglion is really a tubercular synovitis of the tendon sheath. In most of these cases it will be noted that so-called melon seed or riziform bodies are present; and some authorities (as Nieaise, Poulet and Vaillard) have affirmed that whenever this is the case the condition is tubercular. The mode of origin of these bodies has formed the subject of much theorising, and is certainly very puzzling. Apparently identical bodies are found in tubercular joints. Here are sections of the semi-lunar cartilage and synovial membrane excised from a tubercular knee, which was full of loose bodies. It shows these bodies in process of formation. One section passing through the semi-lunar cartilage shows the cartilage to be apparently unaltered, and the fibrous tissue from its base forms a kind of core which blends with the fibrous tissue of the ligaments. The synovial membrane may be traced to the base of the semi-lunar cartilage, and the layer next to the fibrous tissue is very cellular and vascular. The layers next to the joint cavity are studded with typical miliary tubercles, and infiltrated with small round cells (Fig. 9). Another section (Fig. 12) passing through the long diameter of a loose body, the size of a bean, just before it is detached, shows that the pedicle of the body is continued into, and shows precisely the same characters as, the tissues of the joint capsule. The fibrous matrix is very vascular, and is thickly studded with miliary tubercles, as just described in the sections of semi-lunar cartilage. The same structure may be traced without alteration into the, as yet, undetached body. One portion of the body situated at the edge farthest from the pedicle shows a laminated structure like that of a detached torn body, and reacts in a similar way to staining reagents.

Some cases then, of so-called compound ganglia, with melon seed bodies, are clearly tubercular. But are all cases tubercular? Apparently not. This specimen shows a melon seed just becoming detached from the wall of a ganglion. The wall itself is comprised of fibrous tissue, yellow elastic tissue, and collections of small round cells between the fasciculi, and arranged chiefly around vessels. The body is very vascular. There is no indication of tubercle. No bacilli could be detected, and Drs. M'Inerney and Nelly, who kindly made a series of cultures on glycerine agar agar from portions of the wall, when freshly removed, were unable to find any evidence of the bacillus of Koch. Yet this specimen was removed from one of the most extensive and complex

compound ganglia possible. The patient (case 14) was a man aged 49, who was operated on 1st Feb., 1892. In the early part of 1876 he first noticed a slight swelling in the front of the wrist, which gradually enlarged. He is not aware of having received any injury. In 1878 the swelling was incised by a surgeon and a number of rice-like bodies and watery fluid evacuated. The wound healed, and about 6 months after the swelling burst spontaneously and more rice-like bodies were discharged and the swelling diminished. Fifteen months ago the swelling again increased and has continued to spread rapidly. It now affects the sheaths of almost all the flexor tendons, passing under the annular ligament into the palm, and also the extensor tendons of the thumb. The sheaths were very freely removed, and found to be very much thickened. The synovial membrane of the carpus was found to be also affected, and portions of it were removed; the bones seemed unaffected. Notwithstanding the very free interference, the wounds healed, the swelling subsided, and fair movement of the fingers remained. In July, 1892, the swelling reformed around the flexor and extensor carpi ulnaris, and on July 11, their sheaths were freely dissected out, and some more portions of the synovial membrane of the carpus, on the ulnar side, removed with scissors. Since this operation one wound has remained open, discharging a sero-synovial fluid, and the fingers are very stiff. The patient is and always has been in perfect health. Yet, notwithstanding the extensiveness of the disease and the presence of the melon seed bodies, the appearances microscopically are almost identical with those of the simplest form of ganglion; and further, the melon seed in process of formation almost exactly resembles the appearances seen in this section (Fig. 15), taken from a knee-joint in a condition of typical rheumatoid arthritis, to be subsequently described. Here again is a specimen, taken from a ganglion dissected from a constable (Case 15) who received a blow on the back of the hand two years previously, followed by teno-synovitis. The ganglion, when dissected out, proved to be formed of the thickened sheaths of the common extensors of the fingers, and was divided into two portions by the posterior annular ligament. It contained a great number of melon-seed bodies, some clear synovial-like fluid, and some gelatinous semi-solid material adherent to the tendons. The walls of the ganglia (Fig. 10) consist of layers of white fibrous and yellow elastic tissue, containing a large number of blood-vessels. Scattered through the walls, especially near vessels, are irregular masses of small cells, not presenting any tubercular appearance. Immediately adjoining the cavity the wall in many parts is more highly cellular. At various points processes of fibrous tissue, infiltrated with small cells and sometimes enclosing blood-vessels, project into the cavity of the ganglion (Fig. 10). The distal part of the projection consists of fibrinous exudation, and, in some instances, of red blood corpuscles (Fig. 11). The appearances suggest that hæmorrhage has occurred from one of the small vessels, and the extravasated blood has pushed forward some of the more superficial layers of fibrillar tissue. At the edge of the hæmorrhage a dense accumulation of round cells may be seen. No tubercle bacilli could be detected.

An intermediate condition is presented by the following case (16):—A lad of 18, five months ago, received a cut on the back of his left hand with a pocket knife. No swelling existed on the hand previously, but about two weeks after the injury swelling occurred, and has increased to the present size. Now he has a localised cystic swelling, the size of a large walnut, over the common extensor tendons, and which appears to contain loose bodies. It was dissected out, and found to be formed by the thickened sheath of the tendons, and to contain clear synovia-like fluid and melon seed bodies, many

of which were fixed to the tendon. The boy was in perfect health otherwise, with no family history suggestive even of tubercular taint; there has been no recurrence. A microscopical examination of sections of the cyst wall shows that the wall consists of the usual connective tissue basis, and is very cellular and vascular. The blood-vessels are so close in parts that they recall the appearances seen in a vascular papilloma. (Fig. 6.) All their coats are well developed; red corpuscles may often be seen in them, and they are sometimes surrounded by fat. One or two patches of small cell infiltration are found in the wall. These agree in all respects with those described in the simple ganglia. They have not a typical tubercular appearance; no giant cells are present; nor have we been able to detect tubercle bacilli. The melon seed body presents the typical appearance to be presently described. Here we have a distinctly traumatic origin, microscopical appearances identical with those of the simplest form of ganglion, but clinically a compound ganglion, with melon seeds instead of the typical colloidal contents, and yet without the slightest evidence of tubercle. It is admittedly difficult to prove a negative, and one test of the possibly tubercular character of this and other cases—inoculation of living animals—was unfortunately not practicable. The specimens were obtained before the inquiry had taken definite lines, and were preserved in spirit. Animals for inoculation were not on hand at the time of operation, and, further, the Vivisection Act in Victoria makes such experiments difficult to carry out.

Still we think sufficient evidence has been brought forward to show, as remarked at the outset, a regular gradation in different forms of ganglia, from the simplest fibrous cyst of traumatic origin to the most acute tubercular process. What constitutes the difference between the different forms, and how are they to be classified? The differences seem to us to depend on the part of the tendon sheath primarily involved. If the process begins in the outer fibrous portion, either by dilatation of the spaces actually existing there, or as retention cysts by occlusion of the follicles synoviales, what is commonly called a simple ganglion results, a localised swelling with typical contents, and not communicating with the cavity of the sheath. The same process may occur in the joint capsule, and apparently these simple forms do arise much more commonly in the joint capsule than is generally believed. The immediate cause of the process is generally traumatic, and it seems to be of a very chronic inflammatory character. On the other hand, if the process begins on the inner surface of the tendon sheath a compound (so-called) ganglion results. The sheath becomes occluded. The presumably inflammatory products project into the sheath cavity, where there is least pressure. These buds undergo changes in form and condition, and become detached owing to the movements of the tendons, and form loose bodies. The process spreads along the tendons and from one sheath to another, and so forms a complicated swelling. The inflammation of the inner wall may be simple in character from traumatism, as in Case 16, or it may be tubercular; possibly, a simple condition may become tubercular secondarily. The whole condition is thus exactly analogous to the changes that may take place in the synovial membrane of joints and bursæ, where a chronic simple inflammation (from traumatism or rheumatism) may occur, causing synovial and serous effusion and the formation of melon seeds, or a tubercular infiltration, causing the same results, often combined with a more solid growth of granulation tissue. Thus, all along the line we find the same changes in joint capsule and in tendon sheath, which is just what we should expect, the tissues being anatomically identical. This may be shown in the following table:—

	TENDON SHEATH.	JOINT CAPSULE.
Irritation or Chronic Inflammation affecting	I. Outer fibrous layer (causing either dil- ation of spaces, or retention cysts of Gosselin, which grow towards surface). =	So-called simple ganglion. So-called simple ganglion.
	II. Inner lining layer (causing effusion and thickening, growing towards interior). =	Simple arthritis, with forma- tion of melon-seeds.
	1. Simple { So-called compound ganglion, with formation of melon-seeds, = chronic teno-synovitis.	(a) With effusion and melon- seeds. { (b) Fungous. {
	2. Tubercular { So-called compound ganglion = tuber- cular teno-synovitis. {	Arthritis— (a) With effusion and melon- seeds. { (b) Fungous. {

The term ganglion should be restricted to the forms included under group I, and cases of so-called compound ganglion referred to as chronic tenosynovitis.

Our investigations also throw some light on that vexed question, the method of formation of loose bodies, which appears to be essentially the same in cases of joints, bursæ, and ganglia, independently of the tubercular or non-tubercular character of the affection. The innermost layer of the wall of the cavity is pushed forward by something deeper in the wall, and this process goes on till the projection becomes pedunculated, and the pedicle is ultimately broken, probably during some movement of the structures upon one another. In tubercular cases, the projection is formed by one or several miliary tubercles, and the projection at first is exactly similar in structure to the neighbouring part of the tissue, consisting of a fibrous matrix containing abundance of blood vessels and infiltrated with small round cells (Figs. 12, 13, and 14). As it is pushed forward further and further, it tends to become pedunculated, and the contents perish from want of nutrition. Ultimately it is completely detached, the cells it contains disappear, and the whole body is transformed at last into a mass presenting no tissue elements under the microscope, but usually a fairly well-defined laminated structure. In cases which are apparently not tubercular, some of the cellular masses found scattered throughout the fibrous walls of ganglia and bursæ—especially in the vicinity of the blood vessels—seem to push forward after the manner of the miliary tubercles. Such an appearance is shown in Fig. 2. Hæmorrhage from minute vessels sometimes has a part, at least, in their history. In one of our specimens, several of these bodies are to be seen in process of formation (Fig. 10). They are still attached to the wall of the ganglion by a pedicle. This, as well as the adjacent part of the wall and the base of the incipient loose body, consists of fibrous tissue thickly infiltrated with cells indistinguishable in appearance from what may be seen in many parts of the walls. The distal end of the projecting mass shows fibrinous exudation, bounded towards the cavity of the ganglion by a few layers of fibrillar tissue, continuous with that on the margins of the pedicle (Fig. 10). In some cases, this is clearly fibrin enclosing red blood corpuscles and leucocytes (Fig. 11). In cases of rheumatoid arthritis, the projection is formed by the pushing forward of one or more vascular loops (Fig. 15). These become pedunculated, and ultimately detached in a similar way to that described in cases of tubercular joints and compound ganglia. The blood vessels and tissue elements rapidly disappear, and the detached body soon presents no traces of organisation, except the badly defined laminated structure common to loose bodies, with occasionally a few cells between the laminae.

The treatment of the different forms of ganglia remains to be considered. If a simple ganglion can be distinctly recognised as attached to a tendon sheath it can, no doubt, be generally successfully treated by rupture, or by incision. It is, however, very apt to recur, and when this happens it should be dissected out. This is the simplest of operations, easily done, and painlessly, with cocaine, and involving no risk whatever if proper antiseptic precautions be used. When the cyst is deeply attached, and probably to a joint capsule, it is better to dissect it out at once. It is inadvisable to use an Esmarch bandage, because it is followed by so much oozing as to require a drain-tube, and the hæmorrhage can always be easily controlled by pressure forceps. In the case of compound ganglia free removal of the diseased sheath is the only treatment to be advised. It is in many cases a somewhat difficult and always a tedious operation. Even in tubercular cases good results may be

secured (as in case 13, where hardly any stiffness remains after the operation, although the carpus was freely laid open), but it is difficult in these cases to be sure that all affected tissue has been removed, and as seen in case 10 the disease may recur both in the tendon operated on and in other sheaths. In removing the diseased tissues, knife, scissors, and sharp spoons are all required, and it is better to remove too much than too little. It is very remarkable what good movements of the tendon remain after very free removal of the sheath. While removal is the only curative operation to be recommended, it may not be always the best treatment. In elderly people, for instance, or in those with other evidence of tubercle, a free incision (if used with antiseptic precautions) and evacuation of the contents gives relief, and may be all that is required. It does not cure the condition, but the patients can put up with the inconvenience of it for the short remainder of their life.

Fig. 1. A (x80)

SIMPLE GANGLIA



Fig. 1. B (x80)



- a. Fibrous wall of Cyst
- b. Cavity of Cyst
- c. Blood vessels
- d. Clept. like spaces
- e. Collections of Small round cells

To illustrate Paper on Ganglia. (Drs. Syme and Cherry.)

Fig. 3 ($\times 80$)

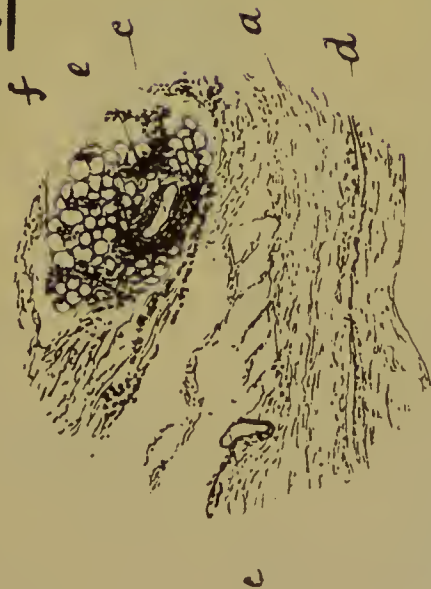
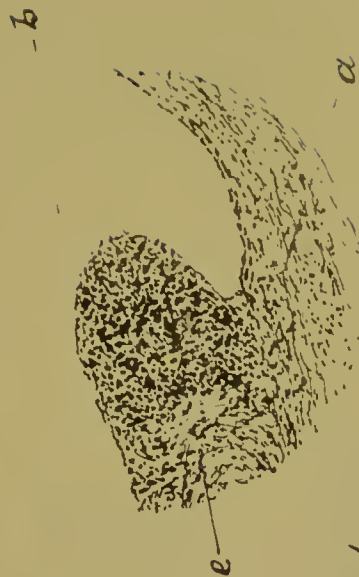


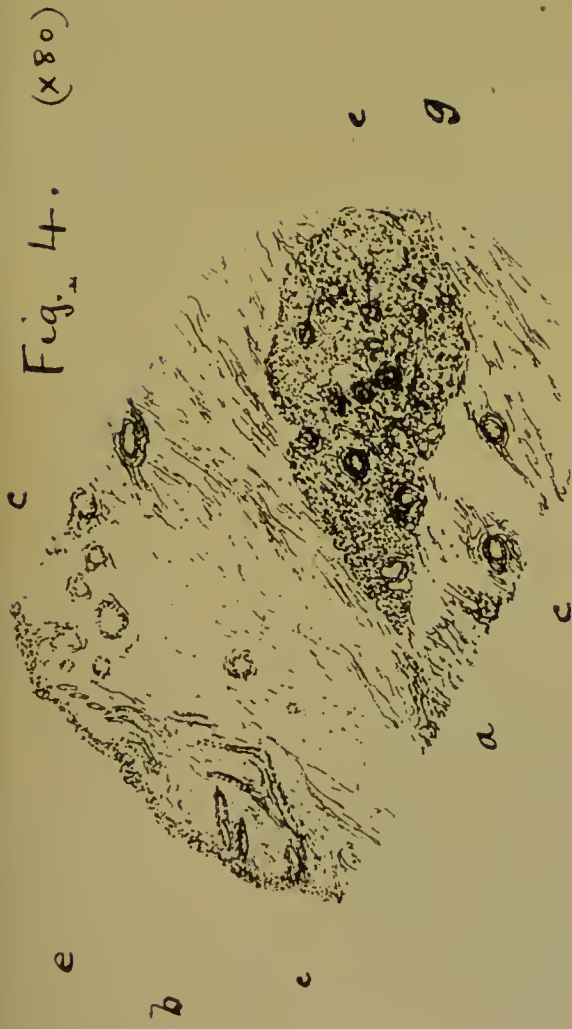
Fig. 2 ($\times 80$)

SIMPLE GANGLIA



- a. Wall of Cyst
- b. Cavity of Cyst
- c. Blood vessels
- d. Cleft like spaces
- e. Collections of Small Round Cells.
- f. Fat.

To illustrate Paper on Ganglia. (Drs. Syme and Cherry.)



Wall of adventitious Bursa.

- a. Wall of Cyst
- b. Cavity
- c. Blood vessels
- e Small cells at margin of Cavity
- g Small cells round blood vessels

To illustrate Paper on Ganglia. (Drs. Syme and Cherry.)

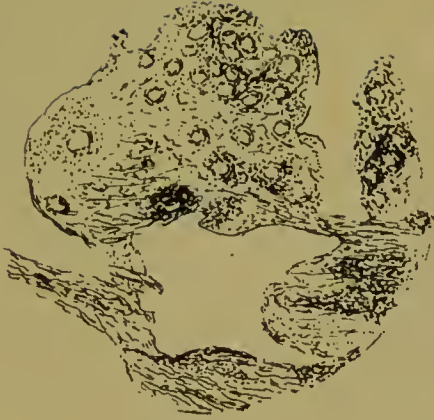
Compound Ganglia.

Fig. 5. (x80)



FIBROUS WALL
highly vascular

Fig. 6. (x60)



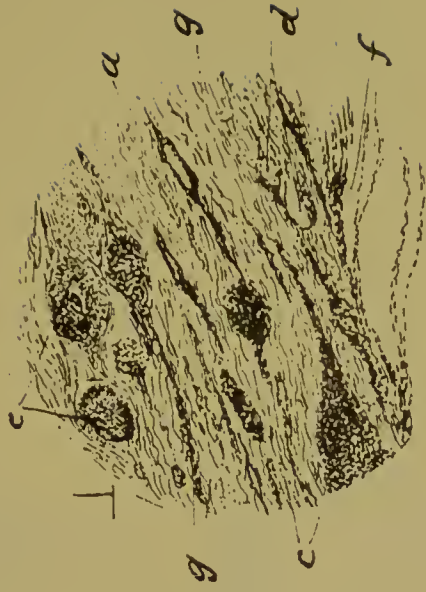
WALL OF GANGLION
*with vascular projection
which may form a loose body.*

TUBERCULAR COMPOUND GANGLIA

Fig. 7. (x80)



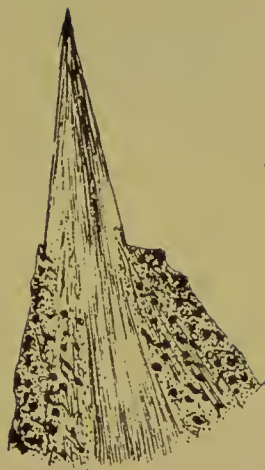
Fig. 8. (x80)



- a. Fibrous Wall.
- b. Cavity of Ganglion
- c. Miliary Tubercles
- d. Blood Vessels
- f. cleft like spaces
- g. lines of small round cells.

To illustrate Paper on Ganglia. (Drs. Syme and Cherry.)

Fig 9(x4)



Tubercular Knee Showing
position of miliary Tubercles.

To illustrate Paper on Ganglia. (Drs. Syme and Cherry.)

FORMATION OF

LOOSE BODIES.

Fig 10. (x80)



FROM COMPOUND GANGLION (non-tubercular)

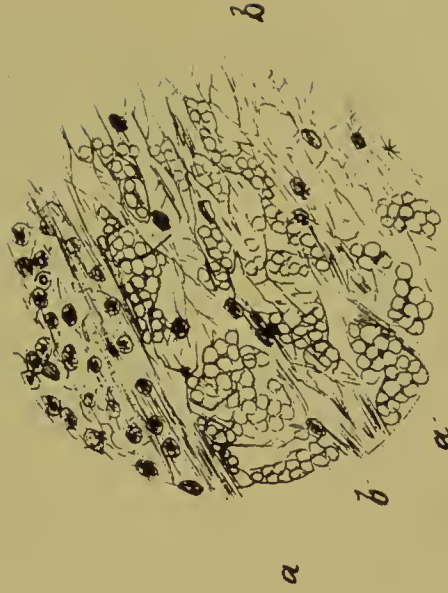
a. Fibrous Tissue

b. Blood Vessels

c. Small Round Cells

d. Fibrinous Exudation.

Fig 11. (x300)



HAEMORRHAGE INTO LOOSE BODY.

in process of formation.

a. Red blood corpuscles

b Filaments of Fibrin.

Fig 12 ($\times 3$)



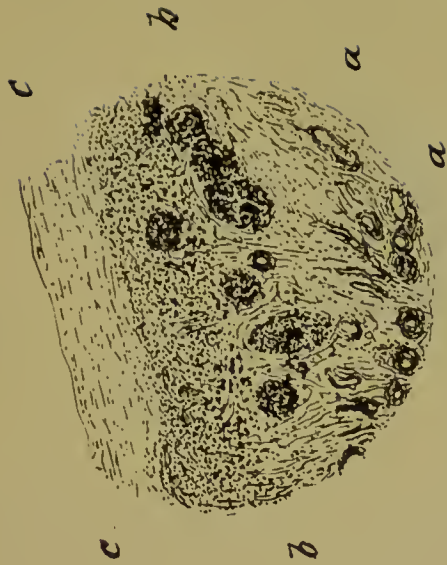
FROM TUBERCULAR KNEE

Showing Miliary Tubercles

- a. Pedicle
- b. Miliary Tubercles
- c. blood vessels.

12a 12-93.

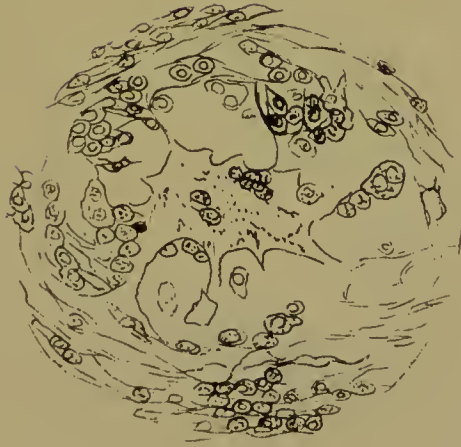
Fig 13 ($\times 80$)



PART OF FIG 12 (A)

- a. Blood Vessels
- b. Miliary Tubercles.
- c. Laminated Margin

Fig 14 (x300)



MILIARY TUBERCLE FROM FIG 13

*Showing typical structure
of giant cell system.*

12 a. 12-93.

(Fig. 15 x60)



FORMATION OF LOOSE BODY.

RHEUMATOID ARTHRITIS.

*Showing Vascularity of
the projections.*

Fig. 16

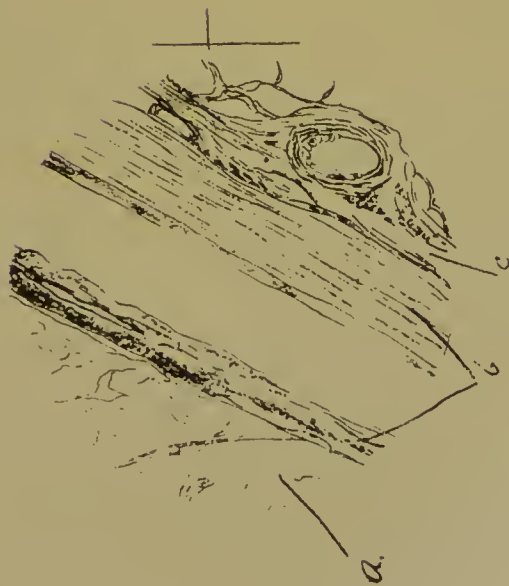
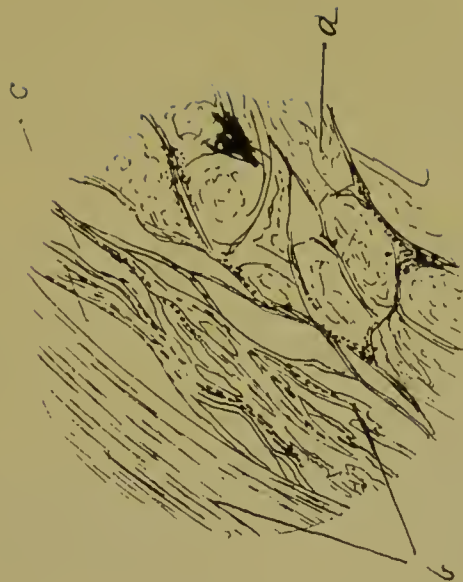


Fig. 17.



NORMAL TENDON SHEATH.

- a. Tendon.
- b. Sheath
- c. Space in between.

To illustrate Paper on Ganglia. (Drs. Syme and Cherry.)

On Treatment of Lateral Curvature of the Spine.

J. A. G. HAMILTON, M.B., Dub., L.R.C.S., Edin.

A FEW months ago I read Dr. Bernard Roth's book on "Treatment of Lateral Curvature of the Spine"; the treatment as advocated by him struck me at the time as such an improvement on the old-fashioned treatment by spinal supports, shoulder straps, plaster-of-Paris jackets, &c., that I determined to try it on the first opportunity, and cannot refrain from placing my experience of the treatment, in three typical cases, before the Surgical section of the Congress. Lying on the back for several hours daily, and the wearing of some stiff steel support for so-called weak backs, with or without osseous deformity, has been the treatment previously prescribed by orthopædic surgeons and others; but as Roth points out, it is perfectly useless for lateral curvature, as far as cure is concerned. If a limb with weak and flabby muscles was put in a stiff splint and kept at rest for several hours daily, the muscles would surely become still weaker, and this is equally true of the spinal muscle. The treatment as advocated by Roth is based upon the following principles:—

- (a) Re-education of the patient's muscular sense, as to an erect and improved position.
- (b) Improved position to be maintained at all times, sitting or standing.
- (c) Attention to dress.
- (d) Systematic training of the spinal and other muscles, including the development of the thorax.
- (e) Attention to general health.
- (f) Subsequent home treatment to prevent relapse in the improvement or cure that has been obtained by the surgeon.

The systematic training of the spinal and other muscles is carried out by the various exercises, as laid down by Roth. Most of these can be carried out by an intelligent nurse, but a few of them require the personal supervision of the surgeon. The "home exercises" can be carried out by the patient with the assistance of a parent or relative; and, as very well pointed out by Roth, the great advantage of his treatment by spinal exercises over that by spinal support and lying down for many hours daily, is, that it always tends to improve the general health of the patient, notably in delicate anæmic and badly nourished girls at the onset of puberty. Since reading Roth's little manual, I have only fallen across three cases suitable for his treatment, but the results have been highly satisfactory, and I am sure that any improved treatment of this hitherto intractable affection ought to be hailed by the profession with delight, for no doubt we have all felt that the older methods of treatment were not only unsatisfactory but contrary to our common sense. I will not enter into the details of Roth's treatment, but would advise everyone to read his little book; and I am sure those who do, will agree with me, that he has opened up a new era for the

treatment of an affection which has hitherto been a bugbear to the profession;—at the same time I cannot help thinking this treatment, which necessitates a good deal of patience and perseverance on the part of both surgeon and patient, has not received that careful attention on the part of the profession it deserves. No doubt the carrying out of these exercises would be a considerable tax on the time of busy general practitioners, but most of them might be carried out by trained assistants under his supervision, just as massage is done; and in my opinion, in all hospitals, one or two nurses ought to be trained to carry out these exercises under supervision; and public instruction might be given to parents and teachers, as to the best positions to be maintained by children, especially delicate ones, at all times whether sitting or standing. Most guardians of the young are imbued with the idea that young people, especially those with a tendency to some spinal curvature, should use a seat without any support to their spine. No doubt this fallacious idea has been the cause of many a deformed spine; and I think it ought to be more generally impressed upon them by the profession that this frequently accepted idea is an erroneous one, and that what is required, is, a suitable support to the sacrum, loins, dorsum, and shoulders, whether the occupation be at meals, at the piano, reading or writing. The Glendining adjustable modern school desk and chair presents all these facilities, and has, I believe, been found most useful for patients of school age, and even for adults.

Case 1.—Miss H., *æt.* 27, seen first November 27th, 1891. *History.*—Never been very strong, always suffered from a weak spine, never been laid up till last December, when she had a prolonged attack of typhoid fever; back felt very weak when she first got up, gradually getting weaker and more painful since; has to lie down nearly all day; the smallest exertion gives her severe pain in back and right side.

On examination, I found the patient tall and rather thin, and the subject of lateral curvature, the whole spine being convex laterally to the left, and the right scapula being about $1\frac{1}{2}$ inches below the level of the left, also some cervico-dorsal convexity causing projecting forward of the head, the thorax flat anteriorly; by a strong voluntary effort she could place herself in almost a normal position; had two months treatment by massage and faradism with rest in bed, at the end of the time back was no better; then had a plaster-of-Paris jacket on for eleven weeks; she felt somewhat better while this was on, but on walking pain was as severe as ever; March 11th, back still very painful, worse than before jacket was put on; quite unable to walk more than a few yards; sitting up for half an hour tires her so that she has to lie down; May 3rd, had first lesson in exercises; was unable to circumduct either knee, or to raise spine from couch; the exertion of coming in to me in the tramcar so exhausted her that she was only able to bear it every second day; May 14th, back stronger, less painful, able to do all the exercises; 20th, does all exercises well; able to walk one way, and to come every day; July 31st, has had 41 exercises, able to do all, even the severe ones, walk in and out every day (about $2\frac{1}{2}$ miles), and go for a walk besides; can sit up most of the day. August 8th, not much pain in back; continues home exercises; is now able to walk further than she has done for the last two years.

Case 2.—Miss R., *æt.* 23, complains of aching pain underneath right shoulder blade; worse after walking; felt pain first about ten years ago; noticed shoulder blade prominent about 4 or 5 years ago; is decidedly increasing; mother and three maternal aunts had a very marked spinal deformity.

On examination, right shoulder blade markedly prominent, nearly 2 inches lower than left; when patient assumes the best possible position there is decided lateral curvature with marked osseous deformity. May 7th, had first lesson in spinal exercises, they were followed by a good deal of pain at first, but kept them up steadily every second day till July 11th, was then able to do all the exercises perfectly without causing any pain. August 10th, on examining the back the deformity is the same, but patient is able to walk any distance without causing pain.

Case 3.—Miss P., *æt.* 15, seen first on May 2nd; is a very tall girl for her age, nearly 6 feet high, but strongly built; had never felt anything wrong till about six months ago, when she felt her back pain after sitting at the piano or playing tennis; the pain has gradually increased; has to spend most of the day lying down; has not been able to do her lessons or play tennis for some months.

On examination I found the patient very tall but fairly nourished; the right shoulder blade prominent, but on assuming the best possible position there was no deformity; after two months daily treatment under my supervision, and three months "home exercises," carried out most conscientiously by her mother, her spine became quite strong, she was able to play tennis, walk any distance, and resume her studies. This case, I think, might be put down as almost a perfect cure; it differs from the others in that it came under notice in time, before any osseous deformity had taken place, but on account of her age and the rapidity of her growth I feel sure had she been treated by rest and spinal support, she would eventually have become permanently deformed.

Remarks on 120 Cases of Tracheotomy for Diphtheria.

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SINCE the early part of 1889 up to the end of August, 1892, tracheotomy has been performed on 120 children suffering from diphtheria at the Sydney Hospital for Sick Children. Of these cases 51 recovered and 69 died, giving us a percentage of recoveries of 42·5.

Although these results are above the average they are nothing remarkable, for far better results have been published.

	Operations.	Recoveries.	Per cent. of Recoveries.
Surgical Clinic in Königsberg, 1878-1882 (Plenio).....	123	60	48·7
Tracheotomies by H. Rankin, Munich, 1878-1885	54	34	63
Tracheotomies by A. Caselli	132	82	62·2
With improved instruments, A. Caselli.....	18	13	72·3

In January, 1890, a separate ward containing four cots was erected, and in this ward since that date all the cases have been treated.

The following table shows the number of cases admitted each year and the percentage of recoveries :—

Year.	No. of Cases.	Recoveries.	Deaths.	Per cent. of Recoveries.
1889	11	6	5	54·5
1890	36	19	17	52·7
1891	49	16	33	32·6
1892 (up to end of August)	24	10	14	41·3
Total	120	51	69	42·5

As to sex, 51 were males and 69 females; 15 males recovered and 36 females. So the male recoveries were only 29·41 per cent. and the females 52·17. So that, although the disease has been more prevalent among girls than boys, a much larger percentage of girls have recovered.

The following table shows the ages of the children :—

	No. of Cases.	Recoveries	Deaths.	Per cent. of Recoveries.
Under 1 year.....	3	1	2	.....
Over 1 year, under 2 years.....	25	7	18	28·0
Over 2 years, under 3 years	24	9	15	37·5
Over 3 years, under 4 years	22	8	14	36·4
Over 4 years, under 5 years	13	9	4	69·2
Over 5 years, under 6 years	15	8	7	53·3
Over 6 years, under 7 years	11	7	4	63·6
Over 7 years, under 8 years	2	1	1	50·0
Over 8 years, under 9 years	1	...	1	.....
Over 10 years, under 11 years.....	2	1	1	.....
Over 11 years, under 12 years.....	2	...	2	.....
Total	120	51	69	

This table shows, then, that 23.3 per cent. of the cases were under two years, and 43.3 per cent. of the cases were under three years. The great majority of the cases that are sent into this ward have to be operated upon without delay. They have nearly all been treated at home for some days, and are only sent to us when the dyspnoea becomes well marked. Nearly all the children are relieved for the time by the operation, although the relief may last but a very short time. Of our 69 deaths, I find that 17 died within 24 hours, 20 within 48 hours, and 10 within 72. So that 47 or 68.1 per cent., died within 3 days. On the other hand, some children linger on a long time and then die. One child lived 18 days, one 19 days, and one 26 days after the operation and then died. If they live some time and die, it is generally due to pneumonia; some have died in consequence of fresh membrane forming in the trachea and bronchi long after it had ceased forming. The majority of deaths are certainly due to the extension of the membrane to the smaller bronchi, where it is quite beyond the surgeon's reach.

It is our custom to operate when the symptoms of dyspnoea become urgent and persist. The operation that is performed in this hospital is always the low one. The trachea is very freely opened with a sharp pointed tenotomy knife. Directly the knife is withdrawn from the trachea, a hook with a deep curve is put into the trachea and then another on the other side; by this means the edges of the tracheal wound are held apart, and we are able to get a good view of the inside of the trachea. Any loose membrane that there may be is now pulled out. If there is much membrane below, it may be fished for with forceps passed right down first into one bronchus, then the other. One word here on the practice of sucking a tracheotomy wound with the lips direct, a practice that I believe obtains even in the present day. It may be a very heroic deed, but I can't conceive any case where it can be necessary or useful, and it is certainly a practice that should be discountenanced by surgeons. If much membrane has been got out of the trachea, some perchloride of mercury lotion, 1 in 500, is gently applied by means of little swabs of cotton wool, held by fine forceps. If we can see no membrane in the trachea, we are very careful not to introduce feathers or any irritating lotion. Whether membrane has been found or not, the external wound is carefully washed with perchloride of mercury lotion. It is then dusted with iodoform, and the tracheotomy tube is introduced. In putting in the tracheotomy tube, care must be taken not to invert the cut edges of the trachea. This, I am sure, is very often done without its being noticed at the time, especially if the opening in the trachea is not long and the tube large. It is very likely to give rise to trouble when it is time to leave out the tube, and it may lead to subsequent narrowing of the trachea. The child is then placed in its cot, and has a steam kettle. Lately, we have hung up cloths saturated with a mixture of turpentine, oil eucalypt, and carbolic acid in the cots, as suggested by Dr. Smith, of Casterton. At the end of twelve hours, or earlier if the child is at all distressed, it is taken from its cot, placed on the operating table in a good light, and both tubes are removed. The trachea is inspected for membrane. If there is any to be seen, it is removed with forceps. If there is no membrane to be seen opposite the wound, but the child seems "stuffy," we spray on the trachea pretty freely with lime-water and boro-glycerine or lime-water and salicylate of soda. This induces cough, and a secretion of mucous and, very frequently, pieces of membrane are coughed up. If nothing comes in this way, we assist by feathering. Afterwards, the wound is treated as before, and a fresh tube a little longer or a little shorter is introduced, and the child is

put back to bed. This process is repeated every twelve hours, or oftener if necessary, as long as the membrane is forming, and both tubes are always removed twice a day until they can be left out altogether. In many cases we use a soft rubber tube after the first three days if there is not much membrane or too much secretion of mucus. These tubes are very much less irritating to the trachea than the metal ones. If a child begins to get "stuffy," and has but very little secretion, and we are unable to get up any membrane, we drop in a few drops of a solution of trypsin by means of a small dropper down the tube. The frequency of its use depends upon the condition of the child, sometimes two or three drops are put into the tube every fifteen minutes. The relief afforded by this means is sometimes very remarkable, and we have certainly saved children in this way. The majority of children certainly die from an extension of the membrane to the smaller bronchi, and until some means is discovered of preventing this, a large number of these children will die. The operation of tracheotomy seems often to induce the membrane to rush down the trachea. A child is operated upon for laryngeal diphtheria. When the trachea is opened, very likely there is no membrane to be seen, or perhaps there may be a little piece above the tracheal opening. In twelve hours' time, when the tubes are removed, the trachea will often be found full of membrane. This may all be pulled up, but twelve hours after that, dyspnoea will probably commence, and the end is not far off.

Mr. Watson Cheyne, in the *British Medical Journal*, five years ago suggested early tracheotomy, the use of a dilator instead of a tube, and the brushing of the trachea very frequently with perchloride of mercury, or the packing of the trachea with gauze soaked in some antiseptic solution above the tube. This latter plan I have tried, but it was not a success, and the dilators cannot be used because they will not keep in the trachea.

Dr. Sims Woodhead, in his address on bacteriology at the recent meeting of the British Medical Association, which you have probably all read, says:—"In the diphtheritic membrane, where, as in an ulcerative endocarditis, the organism is growing on coagulated fibrin (a substance which is readily digested and prepared for the nutrition of the organisms found in these diseases), albumoses are always found, accompanied by an extremely virulent substance entangled in the proteid of the membrane. Diphtheria, then, is entirely dependent for its specific symptoms on the diphtheria bacillus, experiment corroborating, in a most remarkable manner, clinical observations. This bacillus does not readily attack healthy individuals, but where there is slight ulceration of the throat or slight fibrinous exudations on the surface of the tonsils, diphtheria often makes its appearance. Sometimes the exudation appears to be associated with the local action of the diphtheria bacillus itself, but usually the diphtheritic process appears to be grafted on small patches of ulceration and exudation. The diphtheria bacillus does not appear to have a very marked power of attacking healthy mucous membrane, but when it finds a nidus in devitalised cells or coagulated fibrin it is able to produce its special secretion or 'enzyme,' part of which acting on the fibrin, just as the 'enzyme' met with in the stomach acts on food, rapidly transforms the insoluble and undialysable fibrin into soluble albumoses, some of which in turn are utilised for the nutrition of the micro-organisms, whilst the remainder of the 'enzyme' and the products of its action on the fibrin, absorbed by the lymphatics and blood-vessels, are carried into the system, where they act on the tissues and organs."

It is then abundantly clear that if we want to prevent the formation of these highly poisonous albumoses, we must destroy their manufactory, *i.e.*, the membrano. In nearly all cases of diphtheria the membrane is thickest, and covers most ground, in the throat. I do not think it much matters what germicide is applied to the throat as long as it is used thoroughly. Let each man use what he fancies, be it iodine, carbolic acid, chlorinated soda, perchloride of mercury, or anything else. As to internal remedies, we have tried many without finding one much better than the other. The specific for diphtheria has yet to be found. When men tell us that they never lose a case of diphtheria, we may be certain that they have not been dealing with laryngeal diphtheria. Cases of diphtheria in which the membrane does not spread beyond the pharynx, very often get well without any treatment, and always get well if they are properly treated, unless they happen to be really malignant; but these cases are very rare, and when they do occur they always die, no treatment whatever doing them any good; they die poisoned.

On Intubation for Acute Stenosis of the Larvnx.

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THOUGH there has been much discussion as to the relative advantages of intubation and tracheotomy in acute laryngeal stenosis, more especially in that caused by diphtheria invading the air-passages, there is yet much difference of opinion as to which is the preferable operation. The question derives practical importance from the frequency and high mortality of diphtheritic croup. Depending for its answer on the relative weight attached to certain arguments for and against each operation, it will probably be for some considerable time a question on which opinions will differ. I shall endeavour in this paper to consider without bias my recent experience of intubation, in the light of my past experience of tracheotomy. My first cases were chosen for intubation, on account of their unfavourable character, and the remoteness of the possibility of their recovery under any treatment. They died, but the ease of the operation, and its success as a palliative, induced me to try it in more favourable cases, and for a time with much success. Latterly these successes have been succeeded—as so often happens in diphtheritic croup—by a series of failures. I have put my results in a tabular form:—

No.	Date.	Sex.	Age.	Result.	Day of Death or Removal of Tube and Remarks.
1	April 12	F.	10 ms.	Death	Second day.
2	June 7	F.	14 ms.	Death	Thirteen hours after operation.
3	" 15	*M.	4 yrs.	Recovery...	Thirty-five hours after operation.
4	" 20	F.	3 yrs.	Recovery...	Fourth day.
5	" 20	F.	3 yrs.	Death	Admitted moribund; died in six hours.
6	" 25	M.	19 ms.	Death	Second day.
7	July 1	M.	3 yrs.	Recovery...	Tracheotomy; sixteenth day.
8	" 16	*F.	3 yrs.	Recovery...	Fourth day.
9	" 24	F.	4 yrs.	Recovery...	Fifth day.
10	" 25	M.	3 yrs.	Recovery...	Tenth day.
11	" 29	M.	23 ms.	Death	Second day.
12	Aug., 1	F.	2 yrs.	Recovery...	Tracheotomy; fifth day.
13	" 15	M.	20 ms.	Death	Second day.
14	" 17	F.	5 yrs.	Death	Admitted moribund; died in thirty-six hours.
15	" 26	F.	17 ms.	Death	Fifth day.
16	" 31	F.	5 yrs.	Death	Admitted moribund; died in thirty hours.
17	Sept., 1	M.	3 yrs.	Death	Tracheotomy, six hours later; died fourth day.
18	" 10	F.	7 yrs.	Death	Profound constitutional poisoning; died second day.
19	" 20	M.	2 yrs.	Death	Second day.

Of 19 cases, 7 recovered, and 12 died. This table well illustrates the fallacy of statistics based on a small number of cases. The first 12 cases, among which there were 7 recoveries and 5 deaths, might have been quoted as a strong argument in favour of intubation for diphtheria. With the addition of 7 consecutive fatal cases the whole result is by no means brilliant.

Those who have had any large experience of tracheotomy for diphtheria know well the extreme variableness of the percentage of recoveries from time to time; and few I fear have escaped long runs of unsuccessful cases.

I propose to consider these cases critically under three headings, firstly,—cases of recovery, secondly,—the fatal cases, and thirdly,—those complicated by a subsequent tracheotomy.

The first group contains five cases, two of which [marked by an asterisk] were apparently not diphtheritic. The earlier case, which was of a peculiar character, is being published elsewhere, and I shall not, therefore, allude to it here. The latter was peculiar only in the absence of all visible membrane in the fauces and expectoration; yet the extent of the dyspnoea suggested the presence of a diphtheritic croup, and it is not possible, after tracheotomy to be sure that no membrane was coughed through the cannula. Of the remaining three cases two recovered without any trouble, the cannula being extracted on the fourth and fifth day respectively [the day of operation being counted as the first day]. In the third case after extraction on the fifth day the obstruction to inspiration returned and became sufficiently severe on the seventh day, to necessitate the reintroduction of the tube, which was finally removed on the tenth day. In all the cases inspiratory obstruction and recession of the chest wall were great at the time of operation.

It will be convenient here to make some remarks on the operation. Two assistants are advisable, and in the case of older children necessary; if one of these is a nurse of some experience the operation is easier. The child is swathed in a blanket, and held by one assistant in a sitting position. The gag having been inserted is entrusted to the second assistant, who stands behind the child, and is instructed to hold its head in a line with the trunk, neither bent forward nor backward. Some operators, I believe, dispense with the gag, but, except in the case of infants, the operation would, I imagine, be much more difficult without it, and I have not seen its use do any harm. The operator feels for the epiglottis with the left forefinger, and having found it the tube is introduced quickly, but without hurry. With a little practice the introduction is easy. In cases of advanced disease there is a possibility of membrane being pushed in front of the tube and preventing respiration but this is a rare accident. I have noticed it only in two moribund cases in which the tube had been ejected or removed, and was re-introduced. It is important to push the tube home with the left forefinger while the introducer is being withdrawn. If this is not done, as I found in my first two cases, the tube is sure to be coughed out. It is important also to keep the tube in place with the finger while the string is being pulled out. It is not advisable usually to leave the string attached, for it interferes with swallowing, and causes a good deal of irritation. Indeed, one of my early cases plainly indicated his desire to have the string removed immediately after the intubation, and after this was done expressed his satisfaction. The tube itself causes scarcely any irritation. Its introduction usually excites a fit of coughing which relieves the bronchi of accumulated secretion, and is followed by perfect relief. The absence of this fit of coughing is ominous of profound deadening of sensibility by systemic poisoning, and probable speedy death. If the string is for any reason left in, the child's hands must be prevented from catching hold of it and pulling it out; even then the tube is more likely to be coughed out. The extraction of the tube is difficult, more difficult than the introduction; it is necessary to feel its head with the left forefinger while the extractor is carefully guided into its lumen. Some coolness and perseverance may be necessary, but after a few trials the extraction becomes fairly easy.

The toleration, I might almost say the indifference, which the larynx often shows for the presence of the metal tube in its interior is very remarkable. It is, however, advisable I think not to leave the tube in longer than necessary, and I have usually extracted on the fourth or fifth day. Some hours after extraction there may be a return of croupy breathing from fresh inflammatory swelling of the larynx, which develops after the pressure of the tube is removed. If the obstruction is considerable the tube must be re-introduced, but, if only slight, there should be no hurry to do this. While the tube is in coughing is very efficiently performed, so long as the lower part of the trachea is not partly obstructed by membrane, and even then the presence of the tube prevents that distress in breathing that is characteristic of untreated croup. In my cases the lumen of the tube has always been perfectly free from dried secretion after four or five days, and would, I am sure, have kept so for a much longer time. This is in striking contrast to the behaviour of a tracheotomy tube, which needs frequent cleaning, if it is to be kept clear. The child is able to speak with perfect distinctness, though, of course, in a whisper. The swallowing of fluids is usually fairly easy, only exciting a little coughing. By thickening the milk with a little arrowroot and adopting the recumbent position during swallowing this coughing may be avoided. But usually these precautions may be dispensed with. I have only once or twice had any trouble in getting the patient to take sufficient food, and this was only in absolutely hopeless cases shortly before death.

In considering my fatal cases the question I have asked myself is, whether any would have recovered if tracheotomy had been performed in the first instance. I do not think any one would have been saved. My experience in primary tracheotomy for diphtheria—I have operated 46 times with 14 recoveries—leads me to divide these cases roughly for purposes of prognosis into four classes. Firstly,—cases over two years of age in which symptoms of pronounced constitutional poisoning are absent, and in which symptoms of croup have come on gradually and increased slowly, often somewhat late in the course of the disease; these cases are favourable, though one must always be prepared for disappointment. Secondly,—all cases under 2 years of age, among which the percentage of recoveries is very small. Thirdly,—cases in which symptoms of marked systemic poisoning tending to collapse—not simply symptoms of asphyxia—exist before operation; these cases, I believe, invariably die. Fourthly,—cases of early and very rapidly increasing croup, with high temperature and constitutional disturbance; in these cases the prognosis is highly unfavourable. The cases I am now considering came under the last three groups. In none of them did death occur from simple bronchial obstruction, in all there was marked collapse from systemic poisoning before death. In some there was also evidence of the existence of membrane low in the trachea, but the constitutional condition was such as to negative the proposal to remove this by tracheotomy.

The following case is of interest:—H. A., male infant, aged 1 year 11 months. Faucial diphtheria with rapidly progressing laryngeal obstruction and constitutional weakness; intubated with tube and string left attached; three hours later tube was coughed out and was reintroduced, string being now removed; eight hours later I was summoned by alarm-bell and arrived within a minute. I found the child asphyxiated, gasping, nearly dying. The tube was extracted, and followed by the expectoration of a membranous cast of the trachea. Another tube was introduced. There was perfectly free breathing after this, but the child was very collapsed and died ten hours later.

It would certainly have died of the sudden obstruction had I not been on the spot, but it was evidently dying independently of this, and complete relief to the breathing only served to prolong life for a few hours.

Intubation can always be followed by tracheotomy, if advisable. The second operation may be performed on account of the presence of membrane low in the trachea, but usually this is combined with a constitutional condition unfavourable to operation. It may, also, be performed at a late stage of the case, on account of some complication connected with the results of the intubation itself. These latter cases are of good prognosis, and no hesitation should be felt as to operating. I shall give two instances belonging to the latter group of cases, and conclude with one belonging to the former.

H. J. N., boy, aged 3 years, after several days illness became croupy for two days, and was intubated soon after admission for great inspiratory difficulty with commencing cyanosis. There were small areas of membrane on posterior pillars of fauces and pharynx. Complete relief followed after bronchi had been relieved by coughing and string had been removed. During the next two days he lay very ill with elevated temperature and frequent weak pulse. Later he rallied, against my expectation, and recovered some strength. Breathing was always free, and he coughed up small pieces of membrane through the tube. The tube was extracted on the fifth day, its lumen being found quite clear, but had to be reinserted an hour later. On the tenth day it was again removed, breathing was at first good, but became croupy and distressed within half an hour, so that it had to be put back. On the thirteenth day an attempt was made at laryngoscopy, but with very imperfect success. A glimpse of the head of the tube *in situ* was obtained. It was then removed in the ordinary way. Renewed laryngoscopy showed the epiglottis and interarytenoid fold somewhat congested, but the interior of the larynx was not seen. Difficulty of breathing came on again, for a time considerable, but later abated somewhat. It was of a peculiar character, with some inspiratory stridor and obstruction were combined greater expiratory stridor, and prolonged and difficult expiration. For the next two days and nights this condition continued in varying degree, finally getting worse. During this time he could, according to the nurse, phonate distinctly. As he was getting exhausted, I performed tracheotomy on the third day. The thyroid isthmus was found unusually large and firm, so that the trachea was opened low. After two days the tracheotomy tube was removed, and the breathing remained easy through the natural passages. The secondary difficulty in breathing in this case resembled that sometimes caused by the presence of tracheal granulations after tracheotomy, and I suspected the prolonged sojourn of the intubation tube had caused some such condition below the glottis. It is unfortunate that I was unable, owing to the irritability of his throat, to verify this by laryngoscopy.

B. S., a fine girl of 2 years 1 month, was admitted after two days illness with faucial diphtheria. On the fourth day after admission the breathing became croupy. On the fifth day there was increasing obstruction, with restlessness and distress, for which intubation was performed. Three hours later the tube—No. 1, the smallest size—was coughed out. This was at 8 a.m., the breathing was at first unembarrassed, but became gradually worse, until the tube was again introduced at 4 p.m. It was coughed out a second time at 5 p.m. My tubes of the next two sizes were at that time in use, and I had no duplicates. It occurred to me that a few layers of dried collodion over the bulging part of the tube might cause it to be retained below the glottis. I tried this with the desired result. All went well for three days,

until I attempted extraction. I thought I could at first just feel the head of the tube deep in the larynx, and touch it with the extractor. I, however, failed to extract, and after carefully exploring the upper orifice of the larynx without feeling the tube, concluded that it had been probably coughed up and swallowed. The child was quite easy, and nothing further was done for forty-four hours. I then saw the child early in the morning, and found she had had a bad night, and the breathing was distressed. She had coughed with a distinct glottic ring (from closure of the cords), and had slight stridor. I attempted to reintubate with a larger tube, which was now available, but it would not enter the larynx, and the attempt made the breathing much worse. I now thought that the head of the tube must—as turned out to be the case—have slipped below the glottis. The condition of the child was so bad that chloroform was inadmissible, and the trachea was opened rather hurriedly below the thyroid isthmus. After re-establishing normal breathing, the lower part of the intubation tube was seen lying in the trachea. Its head was firmly gripped in the larynx, and it was impossible either to push it up through the glottis, or to pull it down through the narrow ring formed by the cricoid cartilage. A long time—perhaps the greater part of an hour—was spent in attempting its extraction. It was found necessary to enlarge the trachea some way downwards, and upwards to, but not through, the cricoid, when after rotating the tube it was levered out. The isthmus of the thyroid gland was cut through, and some blood entered the trachea, but not very much. After inserting a tracheotomy tube and placing the child back into bed, its condition appeared desperate. Breathing was very frequent, weak, and shallow; and there was not sufficient strength to cough, so that the tube had to be kept clear by the use of a feather. Stimulant enemata were given at intervals, and, thanks to very careful nursing, the child rallied towards evening. Its further good progress was uninterrupted; there was surprisingly little febrile reaction, considering the prolonged critical condition that it had gone through. The tracheotomy tube was removed five days later. The unusual accident which nearly caused me the loss of this case, was clearly the result of my tampering with the dimensions of the intubation tube, by increasing the size of the bulge disproportionately to that of the head. Such a proceeding should be rigidly abstained from. The danger of the accident was mainly due to the fact that I did not recognise what had happened—there being at first no untoward symptoms—until almost too late.

I have one more case to relate:—B. C. Q., a boy of $3\frac{1}{2}$ years, had been croupy for two days and was in great distress, and slightly cyanosed when admitted. No membrane was seen in the throat, but a piece was detached during intubation. The breathing was perfectly relieved, and the general condition appeared fairly good until seven hours later, when while flinging himself about in the bed in a fit of temper, he was suddenly seized with total asphyxia. I arrived immediately after and found him apparently dead, with intensely cyanosed face. He was placed with head hanging downwards, and the chest forcibly compressed, but without dislodging the tube. His head was then raised, the gag hastily inserted, and the extractor used. The tube appeared tightly gripped, but after slipping three or four times, the extractor brought the tube away. The head was lowered again, and he then gave what appeared to be a final gasp, which well inflated the lungs. Breathing was gradually re-established. About half an hour later, when the breathing began to be once more croupy, chloroform was given, and trachea opened above isthmus. A feather was passed into trachea, but coughing brought no membrane into view, and, breathing being quite easy, he was put back to bed. He had a fair night, coughing up much thin phlegm, and, thinking his

condition appeared favourable, I was just leaving the ward when again he was suddenly seized with complete asphyxia. Removing the tubes, I passed a pair of curved forceps into trachea and extracted a large mass of thick tubular membrane. After that, in spite of assiduous local treatment by spraying, he did badly. Several times the trachea was cleared of large pieces of membrane with temporary relief, but he finally died of bronchial obstruction on the fourth day. The sudden asphyxia in this case, which would have proved fatal if I had not been present, is certainly an argument against intubation. It would be a very strong argument were it not that such cases are, I think, very exceptional, and that they usually die in the end however treated.

To sum up. Intubation has the advantages of being quickly and easily performed, of causing no shock or loss of blood, and of necessitating no wound which may absorb of toxic products or set up extensive cellulitis. Those that die after intubation experience, as a rule, less distress than do those who die after tracheotomy. Tracheotomy has the advantage of enabling us to extract masses of membrane from the lower trachea, but it must be remembered that cases in which this has to be done usually die. It also permits us to make local applications to the interior of the trachea. My experience has led me to believe that these have unfortunately no effect in hindering the progress of the disease downwards.

As far as regards private practice, I would suggest:—

1. That where the parents of a child suffering from diphtheritic croup will not permit tracheotomy, intubation ought to be performed.

2. That intubation performed when inspiratory obstruction begins to be pronounced is more likely to be followed by recovery, than tracheotomy performed *in extremis*.

3. That where no skilled nurse can be obtained, as in interior townships, intubation is preferable to tracheotomy. Intubation cases that get well usually do so without interference, whereas a skilled nurse is almost necessary in order to keep the tracheotomy tube clear.

Lastly, I would submit that in the exceptional cases of *catarrhal* croup that require operation, intubation has all the advantages of tracheotomy without any of its disadvantages.

Tracheotomy in Diphtheritic Croup

W. H. CRAGO, L.R.C.P., Lond., M.R.C.S., Eng.

As I think it advisable that every operator should bring the results of his experience under the notice of the profession, in a matter of this kind, in order that a proper conclusion may be come to as to its value, I make no apology for occupying a few minutes of your time in order to give the results I have obtained in a series of nineteen tracheotomies. The accompanying table shows a list of nineteen operations for "laryngeal obstruction," nearly all of which were undoubtedly cases of diphtheritic croup, with the result that ten of them are now alive, or a percentage of 52·6 recoveries. If I claim No. 10 in my list as a success—which I may undoubtedly do, as far as the immediate result of the operation was concerned, as the child lived for three weeks after the removal of the tube, and then died of diphtheritic paralysis—I have a percentage of nearly 58. As these cases have been done under the most disadvantageous circumstances, in small unhealthy houses, and most of them even nursed by the friends, I think it warrants the conclusion which I have come to, viz., that no case of diphtheritic croup should be allowed to die without being given the chance that a tracheotomy affords. In my cases, Nos. 1, 5, and 17, the children were practically dead before the operation, and nothing short of a miracle could have saved them.

In most of the cases consent to the operation has been withheld until the parents saw that recovery was hopeless. While I agree with most authorities on the subject, that early operation gives the best chance, I equally hold that no case is so far gone—while life lasts—as to be refused the possible benefit of operation; for I find it impossible to tell positively by the stethoscope, or any other means, that the membrane has spread down into the bronchi.

In performing the operation I have the head thrown well back over a hard pillow, made by rolling a wine bottle in a towel. It is very important to keep the head in a line with the body. I do not make a long incision, not more than $1\frac{1}{4}$ to $1\frac{1}{2}$ inch in length; although this gives more trouble in exposing and dividing the trachea than a long one does. I make the whole depth of the incision with a knife, not tearing through the deeper tissues with forceps as some operators recommend. It is always advisable to feel for the trachea occasionally with the forefinger of the left hand, as it very easily slips aside. I pay no attention to the isthmus of the thyroid, and experience no untoward symptoms even if it be divided. Having exposed the trachea, and allowed the bleeding to subside, I fix the trachea either with a sharp hook or the fingers, and divide two or three of the upper rings, cutting from below upwards with a pointed knife, as a Syme's abscess knife. With as little delay as possible I introduce the tracheal dilator, and after allowing a little time for the expulsion of the viscid mucus that is nearly always present, and occasionally a distinct piece of membrane, I pass the tube between the blades of the dilator, without following the practice advocated by Watson Cheyne, and I believe adopted by Dr. Clubbe, of holding the edges of the trachea apart and swabbing out the interior with perchloride lotion. In case 17, however, two days after the operation, when the child again became asphyxiated, through the spreading downwards of the membrane, I was able, with a pair of tracheal forceps, to seize the membrane and remove it, and so, I verily believe, saved the child's life. In this case, as well as in one or two of the fatal cases, I swabbed out the interior

of the trachea frequently with a strong perchloride lotion. The tube I prefer is one with a movable collar, and two distinct or complete channels. It may not be quite so easy of introduction as the bivalve, but I am sure that it does not hurt the patient so much during changing. The movable collar, I think, allows of freer movements during respiration and coughing. A feather is passed through the tube for a few times after it is introduced to create cough, and so expel any blood or mucus that may be in the trachea. The bleeding (vonous) stops almost directly the tube is introduced. In the after treatment, I place the cleaning of the tube first and foremost, and am of opinion that many cases have been lost in the past through the neglect of this. Only the other day, in turning up some references to tracheotomy in the *British Medical Journal*, I found two cases reported by someone who admitted that one died through blocking of the tube. I have the inner tube cleaned every few hours, or as often as it shows the least sign of being obstructed—generally shown by a hissing kind of noise—and make a rule of doing it myself three times a day for the first three or four days. I have seldom removed the outer tube within forty-eight hours of the operation, but after that time remove it and thoroughly clean it every day, and generally by that time there is no difficulty in introducing it, as the tissues have become cemented together with lymph.

Next to cleaning the tube I put diet, and give nourishing diet from the first, such as egg-flip, strong broths, and milk; and in a few days find that children will take sponge cakes or bananas more readily than liquids. Next in importance, at present, I place the administration of a mixture containing liq. hydrarg. perchlor., combined with perchloride of iron. For the use of the perchloride of mercury, I am indebted to a paper read by Jacobi, at the annual meeting of the British Medical Association at Glasgow some years ago. Since using it I have been able to omit the tube at a much earlier date than before. As regards the use of the steam kettle, I have only used it in one or two cases, and think the routine use of it, in all cases, does rather more harm than good; its use is found in those cases where the secretions of the trachea are very dry and tenacious. Spraying of the orifice of the tube I have practised much more freely, sometimes using a Seigel's Steam Spray Producer, at other times an ordinary hand spray producer. The substances used in this way have been various, such as lime water—lime water containing lactic acid 10 minims to the ounce; and where there is evidence of the membrane spreading downwards I prefer a solution of papain and borax, as given in *Martindale's Extra Pharmacopæia*. Where there is much membrane on the fauces, and the child does not struggle too much, I continue the brushing with some antiseptic pigment, which, in most cases, has been in use before the operation; but if the child struggles very much, which is often the case, I leave the fauces alone.

In nearly all the successful cases shown in my list, towards the end of the first week, the deglutition of milk or other liquids has caused some cough and the expulsion of some of the liquid through the tube. This, in the first case that it occurred, caused me some alarm, as I had seen a case in England where the tube had been so tightly tied in as to cause ulceration through the posterior wall of the trachea into the œsophagus—a careful examination, however, soon dispelled the fear. This want of co-ordinating power in the muscles of deglutition soon passes away, not having lasted more than a week in any of my cases. At the time there is this difficulty in swallowing liquids; soft solids, such as bananas or sponge cakes, can be swallowed much more easily.

TRACHEOTOMIES.—By W. H. CRAIG, L.R.C.P., M.R.C.S.

No.	Sex.	Age.	Condition at time of Operation.	Anæsthetic.	Tube used.	Progress and After Treatment.	Tube left out.	Result.
1	F.	4 yrs.	Asphyxiated, no membrane on fauces.	None	Trousseau's.	Free discharge of viscid mucus. Chief attention to cleaning tube	17th day.	Recovery.
2	M.	2 "	Urgent Dyspnoea, membrane on fauces.	Chloroform & Ether.	Bivalve	Relief only imperfect. Vomiting incessant to death (13 hours)	.....	Death.
3	F.	7 "	Urgent Dyspnoea, membrane on tonsils.	Chloroform.	Bivalve and Vulcanite.	Membrane expelled daily for 3 or 4 days. Mist. ol. Eucalypti. Occl. brushing of fauces. Liquids escaped through tube 10th to 17th days.	21st "	Recovery.
4	M.	6 "	Urgent Dyspnoea, membrane on tonsils.	"	Trousseau's.	Some extension downwards 2nd day. Frequent spraying with steam impregnated with eucalyptus. Cellulitis of neck. Diphtheritic paralysis. Mist. syr. fer. phosph. Co. Illingworth's mixture. Occasional brushing fauces with sol. pot. perm. Liffates and albu. in urine. Liquids escaped through tube. Syr. fer. phosph. co.	18th "	"
5	F.	4 "	Asphyxiated, membrane on tonsils and uvula.	None	"	Brushing fauces with sol. pot. perm. Liffates and albu. in urine. Liquids escaped through tube. Syr. fer. phosph. co.	15th "	"
6	M.	4 "	Urgent Dyspnoea, membrane on tonsils and fauces.	Chloroform.	"	Sprayed mouth of tube with sol. ac. lact. et ac. carbol. Membrane appeared on edge of wound. Made several attempts to leave out tube; child very well for 3 hours after it was left out, then died suddenly.	34th "	Death.
7	M.	2 "	Urgent Dyspnoea, membrane in nostrils and on fauces.	"	"	Steam-kettle used. Occasional spraying of mouth of tube. No medicine for several days, afterwards mist. fer. phosph. co. Membrane spread	20th "	Recovery.
8	M.	2½ "	Urgent Dyspnoea, membrane on tonsils and uvula.	"	"	Sprayed 3 sol. ac. lact. et liq. calc. every half hour.	.....	Death, 78 hours.
9	F.	18 ms.	Urgent Dyspnoea, membrane on tonsils and uvula.	"	Trousseau's and vul.	dwds. Rcm. cast of tr. Applied sol. hyd. per 1 in 500. Swabbed Membrane spread downwards. Vomited once or twice.	.....	Death, 86 hours.
10	F.	3 yrs.	Urgent Dyspnoea, membrane on tonsils and uvula.	"	"	trachea 3 sol. hyd. per 1-500. Freq. spraying 3 liq. calcis. Several attacks of dyspnoea following. Rcid. by spraying 3 liq. calcis. Tube left out 12 hours 13th day, but had to be replaced. Diphtheritic paralysis set in a fortnight after removal of tube.	21st "	Death.
11	M.	7 "	Urgent Dyspnoea, membrane on tonsils.	"	Bivalve	Ol. tereb tried before operation. Occasional spraying 3 liq. calcis. Uninterrupted recovery.	9th "	Recovery.
12	F.	13 ms.	Urgent Dyspnoea, membrane on tonsils.	"	"	Cellulitis of neck. Membrane spread downwards. Spraying, mist. ferri, perchlor. Applied sol. chloral hydrate to inside of trachea.	.....	Death, 56 hours.
13	F.	7 yrs.	Urgent Dyspnoea, membrane on fauces.	"	R. Parker's.	Nearly died on table—some difficulty in introducing tube. Did not see patient after operation.	.....	Death, 38 hours.
14	F.	4 "	Urgent Dyspnoea, membrane on fauces.	"	Trousseau's.	Occasional brushing of fauces 3 liq. sod. chl. et glyc. Mist. liq. hyd. per 3 fer. perchlor. Did not see child after operation	6th "	Recovery.
15	F.	5 "	Urgent Dyspnoea, membrane on fauces.	"	Parker's....	Sprayed 3 Papain. Did not see child after operation	.....	Death, 12 hours
16	F.	3 "	Urgent Dyspnoea, membrane on fauces.	"	Trousseau's.	Mist. liq. hyd. per 3 fer. per. Occasional spraying 3 sol. acid lact. in liq. calcis. Slt. hemorrhage in changing tube.	7th "	Recovery.
17	F.	4 "	Asphyxiated, membrane on tonsils and uvula.	None	"	Mist. liq. hyd. per 3 fer. per. Again asphyxiated 2 days afterwards. Rem. membrane 3 forceps; swabbed trach. 3 sol. hyd. per. Sprayed frequently 3 sol. papain et boracic. Diphtheritic paralysis, affecting muscles of respiration a month after operation. Hypod. inj. strychnine gr. xlv bis. die.	8th "	Recovery.
18	M.	26 ms.	Urgent Dyspnoea, membrane on fauces.	Chloroform.	"	Mist. liq. hyd. perchlor 3 fer. Swabbed 3 sol. hyd. per. after operation.	.....	Death.
19	M.	15 "	Urgent Dyspnoea, 4 or 5 days, no membrane.	"	"	Mist. hyd. per. &c. Vomiting troublesome. Uninterrupted recovery. A fortnight after tube was left out had return of noisy breathing, but inuprd. under mist. liq. arsenicalis, et ol. morth.	10th "	Recovery.

Case of Acute Appendicitis—Perforation, Diffuse Purulent Peritonitis, Drainage, Recovery

JOHN GIBSON, M.D., Ch.M., Edin.

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TEN years ago, Dr. George Oliver, in Quain's "Dictionary of Medicine," writing on inflammation of the vermiform appendix, states that "general peritonitis from sudden perforation into the cavity of the peritoneum is the great danger in these cases, recovery from which is extremely rare." Hilton Fagge, four years later, in his "Principles and Practice of Medicine," speaks of "the rapidly fatal cases of perforation of the appendix vermiformis." And Erichsen, in the ninth edition of his "Science and Art of Surgery," vol. 2, p. 901, has these words: "If actual perforation of the vermiform appendix has occurred, the chance of recovery is certainly very small if the patient be left to Nature. Unfortunately, also, if general peritonitis has set in, the chance of relief by surgical treatment is not much greater, as, owing to the firmness of the lymph glueing the coils of intestine together, it is practically impossible to clean the peritoneal cavity." Osler, in his text-book on "Medicine," published this year, affirms that appendicitis "must be ranked as one of the most serious and fatal of the abdominal affections of young persons." "Extension to the general peritoneum is almost always fatal."—Pages 411 and 412.

Cases of recovery after the occurrence of diffuse purulent peritonitis, resulting from perforation of the appendix vermiformis, are thus, admittedly, of sufficiently rare occurrence to warrant my bringing before your notice the following successful one, which came under my care during the month of May last:—

Dr. Helsham, of Richmond, had been in attendance from the commencement of the serious symptoms, the writer having been called in consultation during the evening of the fourth day. The patient—a bright, intelligent boy, 11 years of age—had enjoyed good health up to the time of this attack. He was not considered to be a very strong or robust boy, but the only things he suffered from were slight "bilious" attacks after eating sweets or indigestible food, and mild attacks of bronchitis. His appetite, as a rule, was very good, and his bowels acted naturally. One of his favourite amusements was to shoot at birds with a "catapult." He used pellets of ordinary shot with which to kill the birds, putting a quantity of shot into his mouth at one time, and withdrawing, as occasion required, sufficient wherewith to charge his "catapult." Sometimes he swallowed shot inadvertently; at other times he would swallow them "just for the fun of the thing," because he saw other boys do the same. On the 8th of May he went trapping birds, and came home with a bad headache, pain in the abdomen, and felt sick; would have nothing to eat. The pain and sickness disappeared after he went to bed, and he slept all night. Next day he went to school, did not eat much dinner, felt too sick to have tea, but ate an apple on going to bed; was restless all night, complaining of pain in the right iliac region, extending inwards and upwards over the abdomen. The following morning he felt

worse, pain in the right iliac region still persisting, and getting more severe. Headache and vomiting set in during the day. In the afternoon the bowels were moved three times without any aperient medicine, but they did not act again until the day after the operation, when an enema was given. Dr. Helsham was now called in. All night the patient was in pain, and vomited from time to time. On the 11th of May he was in much the same condition, the pain and sickness continuing. Slept very little during the night, vomited frequently, and was restless and feverish. His condition rapidly getting worse, I was requested to see him, with Dr. Helsham, on the evening of the 12th May. At that time he had a temperature of 101° , and presented the typical appearance of a patient suffering from acute peritonitis. Anxious expression, pinched features, tongue dry and furred, with sordes on the teeth; lips cracked; short, shallow respiration; pulse small and thready; and a marked tenderness over a considerable part of the abdomen, which was somewhat distended, with rigid walls. An ill-defined swelling was easily recognised occupying the right iliac region, and passing upwards towards the right lumbar region. This swelling was exceedingly tender, the patient crying out as soon as it was touched. In addition, there was distinct dulness on percussion over the whole of the lower part of the abdominal cavity extending almost as high as a line running midway between the pubes and umbilicus. There was not much difficulty in arriving at a diagnosis of the case. The question of treatment, however, was an anxious one. After due consideration, it was decided to adopt the principle of treatment advocated and practised by Lawson Tait, Treves, Barwell, and others, which is of comparatively recent date, but which appeared to afford the best chance of recovery in this instance. Accordingly, Dr. MacCormick of Sydney, was sent for with the view of operating on the patient. About mid-day on the 13th—the sixth day from the beginning of the symptoms—he performed abdominal section, in the middle line, giving exit to at least two pints of very fetid pus. As there was considerable matting together of the coils of the intestines, Dr. MacCormick decided—very wisely, as the result proved—not to interfere with the vermiform appendix, but contented himself with inserting an ordinary glass drainage tube and applying the usual antiseptic dressings. The pus was drawn off, and the peritoneal cavity washed with weak iodine lotion every hour during the first six days, after which it was done every three hours, until, finally, once or twice daily was considered sufficient. The quantity of pus gradually diminished from two drachms every hour during the first day, one drachm every hour the second day, half a drachm the third day, to a few drops only every hour on the sixth day. The fetid odour remained for a fortnight, notwithstanding careful antiseptic treatment. The temperature fell to normal during the afternoon of the second day and remained normal until the afternoon of the fourth day, when it ran up to 100.2° falling again next morning, but rising the same evening to 100.2° . The evening temperature remained at 100° until the eighth day from the operation, when it rose to 101.2° , which point it also reached the evening of the next day. This evening rise was followed by a morning remission, and was caused by an accumulation of pus, which had become partly encysted in the neighbourhood of the vermiform appendix. On the tenth day this pus drained freely through the abdominal wound, after which the temperature remained practically normal, only once rising to 100.6° , probably on account of gastric disturbance. The glass drainage tube was taken out and washed in 1 in 40 carbolic lotion on the third day, and subsequently every three hours, till the fifth day from the operation, when it was removed and

replaced by a large rubber tube, which also was washed in carbolic lotion and a fresh one inserted as often as was required. As the wound contracted a smaller tube was inserted up till the twentieth day, when the drainage tube was finally removed. The wound was healed on the thirty-seventh day from the date of the operation. An ill-defined tender swelling remained in the right iliac region for nearly three weeks after the operation; and during the first fortnight the patient complained very much of sudden sharp pains in the swelling shooting into the right thigh, lasting only a few minutes each time. As regards nourishment, he had teaspoonful doses of milk and water, barley water, and iced sodawater at frequent intervals until the sickness went away. One teaspoonful of brandy in water was given every hour for the first fortnight. Beef jelly, chicken broth, junket and wine jelly, in addition to the preceding, formed his only nourishment until the seventh day, when he was allowed a little bread well soaked in his beef-tea. Boiled custard, fish, lamb chops, poached eggs, and chicken were administered as his appetite improved. After the first fortnight he was put on ordinary diet, his appetite becoming exceptionally keen. His bowels were carefully attended to after the operation, simple enemata being administered as required. On the ninth day a dessert-spoonful of castor oil was given with good results. Epsom salts were ordered once, and Seidlitz powders occasionally as the case proceeded; but enemata were, for the most part, had recourse to. On the fourteenth day he was allowed to sit up in bed. He was carried downstairs on to the verandah on the twenty-second day after the operation; and three days later he walked downstairs with assistance. From that time recovery was rapid and uninterrupted. Since his recovery he has not complained of anything unusual. At the present time he is fat and plump and looks the picture of good health.

REMARKS.

This case was a most serious one and gave us much anxiety for some time. Fortunately, the patient made a good recovery. I am inclined to attribute the successful issue—

- 1st. To the operation, which, by allowing free drainage to the fetid pus tended to prevent septic absorption, thus offering the only chance of saving the patient's life.
- 2nd. To the removal of the fetid pus as soon as it formed, and washing the peritoneal cavity, with the view of preventing any fresh septic poisoning.
- 3rd. To the exceptional care and skill on the part of the nurse, without whose loyal and hearty co-operation, aided as it was by the patient's own relatives, all our efforts would have been in vain.

Exhibit—Case of Pylorectomy.*

ALEX. MACCORMICK, M.D., Ed., M.R.C.S., Eng.

Lecturer on Surgery, University of Sydney, and Surgeon to the Prince Alfred Hospital, Sydney, on July 10, 1890.

H. J., a married woman, aged 54, was admitted into the Prince Alfred Hospital, Sydney, on July 10, 1890.

Condition on Admission.—Patient complains of vomiting after taking food. This commenced about four months previously, and during this period of time the patient has been rapidly losing flesh. The vomiting commences about three hours after taking food. The ejecta consists of digested food, and have never contained either blood or sarcinae. She complains of a sense of fulness in the stomach but no pain. The bowels have been sluggish since the onset of the illness, and the faeces present no abnormal appearance. She has frequent eructations. The tongue is moist and very clean. The abdomen is somewhat retracted, but there is an extensive tympanitic area over the region of the stomach. There is no tenderness on palpation, and no abnormal swelling is to be detected. The respiratory and circulatory systems are healthy. The urine is neutral in reaction, phosphatic and slightly turbid. Patient weighs 8 st. 9 lb.

Diagnosis: Pyloric Obstruction and Dilated Stomach.—Patient was put on liquid diet, and the stomach washed out once a day with a weak solution of Condy's fluid. This treatment was continued for eight weeks, during which time she remained *in statu quo*. From the date of admission until October 16 patient only lost 3 pounds in weight, and so far no abnormal swelling could be felt in the abdomen, and she had no pain.

An exploratory abdominal incision was decided upon; the dangers of the operation were fully explained to the patient, and she gladly gave her consent. As the cause of the obstruction was obscure preparations were made beforehand for the operations of pylorectomy, gastro-enterostomy, and Loreta's operation.

October 16: The stomach having been washed out with boro-glyceride solution (1-30) half an hour previously, the patient was brought under the influence of chloroform, and, on palpation (bimanually) in the right hypochondriac and lumbar regions, an elongated tumour of the pylorus could be felt. An incision about 3 inches long was made over this, the incision running parallel to the lower margin of the thorax midway between it and the umbilicus. The peritoneum having been exposed at the bottom of the incision, all bleeding vessels were tied. On opening the peritoneum the fundus of the gall-bladder presented itself; this was pushed upwards with the finger, when the pylorus could be felt, freely movable, hard and smooth, and considerably thicker than the wrist and tapering towards the duodenal end. The pylorus was now drawn into the wound and held there by an assistant whilst the attachments of the stomach to the great omentum below, and to the lesser above, were gradually ligatured off. The tumour was slightly adherent behind; this attachment was freed and two lymphatic

* Nearly two years after operation.

glands which appeared to be enlarged were removed. The pylorus could now be lifted freely out of the wound; a large flat spongio was placed in the abdominal cavity and a fold of aseptic gauze drawn under the now isolated pylorus. The next step in the operation was to make an oblique incision downwards, and to the right through the stomach walls, with a pair of straight scissors, beginning at the lesser curvature and keeping well clear of the growth. Thus a gaping opening was left in the stomach, extending about two-thirds of the way across it. This is now closed in the greater part of its extent by a row of silk stitches (Lembert's method). Straight needles, No. 5, were used, threaded with fine silk, the silk having been previously prepared by boiling for half an hour in a 5 per cent. solution of carbolic acid. The ends of these stitches were left long so as to give a hold on the viscus. The pylorus was now freed from the body of the stomach by a stroke of the scissors and turned over to the right side. The bleeding from the stomach walls, which was rather free, was stopped with fine catgut ligatures. The stomach contained a little mucus and the mucous membrane looked clean; its interior was cleaned out with a carbolised sponge. The duodenum was next divided for two-thirds of its circumference on its posterior aspect, and, after wiping away its contents, a small sponge with a string attached was introduced. The divided part was then attached to the corresponding part of the cut end of the stomach by a closely-set row of silk stitches, one-eighth of an inch apart, which were not yet tightened. The remainder of the circumference of the duodenum was now severed, and the stitches of the row just referred to were knotted from the inside. The sponges were then removed from the stomach and duodenum, and as many stitches as possible inserted from the inside. The point of junction of stomach and duodenum was now turned over and a second row of stitches introduced behind, and this was carried on all round, and also along the oblique incision in the stomach. Altogether ninety-eight stitches were used between stomach and duodenum. All the parts were then thoroughly dried with aseptic sponges, the large flat sponge was removed from the cavity of the abdomen, and when the stomach was allowed to drop into its normal position it looked remarkably natural. The abdominal wound was closed by means of four deep fishing-gut sutures and a few superficial horse-hair ones. A large flat pad of salicylic wool was placed over the abdomen and kept *in situ* by means of a many-tailed bandage. The interval from the time the administration of the anæsthetic was commenced until the patient was removed from the operating theatre was two hours and ten minutes, so that the actual time the operation took was under two hours. There was very little hæmorrhage throughout. At the commencement of the operation the patient's pulse was 70, and weak; during the operation it fell to 42, and towards the finish rose to 48.

October 17: Patient slept four hours twenty minutes during night. Had a teaspoonful of warm water occasionally to moisten lips and tongue. Pulse, 74; temperature, 100·4. Complains of slight shooting pains in the abdomen. Having nourishment per rectum every four hours. Enemata (consisting of beef tea, peptonised milk, and brandy, four ounces in all) and nutrient suppositories alternately. The bowel to be washed out with enema of warm water every morning. Urine drawn off with catheter.

October 18: Pulse, 56; temperature, 99·6; respiration, 18. Urine turbid, slightly blood-stained, and somewhat offensive. Complaints of burning pain when passing water. Slept seven hours. To have 3 ii. of peptonised milk with a few drops of brandy by the mouth. Enemata as before.

October 19: Pulse, 76; temperature, 100; respiration, 20. Taking same nourishment per rectum. To have 3 ii. milk and barley water, at intervals, by the mouth. Urine still causes some trouble. No pain in abdomen.

October 20: Pulse, 76; temperature, 99.4; respiration, 20. To have 3 ss. liquid nourishment at short intervals by mouth. Discontinued brandy with enemata. Slept well. Had a stool—loose yellow fæces. Gave Brand's essence of beef 3 i., at intervals.

October 21: Pulse, 62; temperature, 98.6; respiration, 18. Still some enemata. Barley water, Brand's essence, and peptonised milk, by the mouth, about 3 x. altogether in 24 hours. Complains of feeling hungry. Still some pain during micturition—the urine much improved. Had a stool; fairly normal. Nourishment by mouth to be slightly increased.

October 22: Pulse, 62; temperature, 99; respiration, 18. Urine still turbid. Looked at wound, which was dry and free from redness. Removed all the stitches save one. Complains of a tender spot in the line of the incision. Nourishment by mouth to be increased.

October 23: Pulse, 64; temperature, 98.4; respiration, 16. Rectal feeding still continued. Took 3 xviii. of nourishment by mouth. Removed remaining stitch. Has no pain or sore feeling except on movement. To have some cocoa and beef-tea by the mouth.

October 24: Pulse, 72; temperature, 97.6; respiration, 18. Feels very well. Rectal feeding continued. Takes 3 iss. liquid every two hours. To have chicken broth.

October 25: Pulse, 56; temperature, 97.6; respiration, 16. Giving 3 ii. of liquid food by mouth every two hours. Bowels moved. Bladder trouble nearly disappeared. Feels well; sleeps well.

October 26: Pulse, 60; temperature, 98.4; respiration, 18. Same rectal feeding. Took 3 xxx. by mouth during last 24 hours. Bowels moved. Dressed wound. There was a small focus of suppuration at the spot where the last stitch was removed; this accounted for some slight tenderness felt there.

October 27: Pulse, 64; temperature, 98. Same feeding with a little boiled custard which the patient fancied.

October 30: Discontinued enemata. To have three nutrient suppositories in 24 hours. Takes about two pints by mouth. Removed from bed on to a couch for some time in the middle of the day.

October 31: Rectal feeding entirely discontinued. Has same food by mouth, with a soft boiled egg in addition. Latterly left much longer intervals between the times of feeding.

November 1: Very well. Had a small piece of fish for dinner, and enjoyed it.

November 2: Out on the verandah all day on couch. Feels hungry, and not satisfied with the quantity of nourishment given. Bowels moved after warm water injection.

November 3: Feels well and hungry. Had fish, bread, and butter, in addition to her usual sop foods.

November 5: Walked a few steps; feels weak. Taking nourishment well.

November 9: Up all day. Feels ravenously hungry. Allowed a mixed diet.

November 10: Weight, 8 st. 6 lb.

November 14: Weight, 8 st. 8 lb. 1 oz. To have a warm bath. Shortly afterwards the patient was discharged, and went to the Carrington Convalescent Hospital, where she remained for a week, after which she returned to her domestic duties.

She reported herself at the end of January, 1891, when she expressed herself as perfectly well. The adipose tissue on the front wall of the abdomen has considerably increased.

February 20: Patient visited me to report herself. Has made flesh; is fully nourished. Complexion good, countenance placid and cheerful; says she is quite well, and was never better; takes the food of the family, and does not in any way suffer from indigestion. Bowels regular; tongue clean.

September 26: Patient called on me; she is still quite well, can eat anything, and works hard.

Patient at the present time is well nourished and cheerful, and she can digest any of the ordinary foods.

Remarks on the Radical Cure of Hernia.

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IN this short paper I wish to make a few observations on hernia, and to relate a method which I have employed for some time of effecting what I believe to be a radical cure. There is no need for me to enter into a discussion as to the possibility of shortening the mesentery or its muscle, as such a proceeding is hardly within the bounds of legitimate surgery yet. It is the treatment of the sac and the closure of the external abdominal ring of which I wish to speak. Here a trouble at once meets one, as many good surgeons and anatomists believe that it is the opening in the fascia transversalis, and not that in the aponeurosis of the external oblique, which is the principal potentiality in the protrusion of the gut beyond the limits of the abdominal cavity. The internal abdominal ring undoubtedly, if it is deep, offers an invitation to a piece of gut to descend; but its importance as a factor in the causation and continuance of a hernia is largely discounted when there is a congenital sac, and when a hernia has been in actual existence for a long time. Now, when a hernia has been allowed to remain down for a long time, or when a congenital sac is present, the internal abdominal ring can, I think, be ignored. Our object is to prevent a piece of intestine coming down by other means than a truss. This must be a hard matter, as we find so many methods, and their modifications, on such entirely different principles. Many of them are good and efficient in many cases; no one operation is applicable to all cases. Operations after which it is still necessary to wear a truss, even a light one, cannot be called radical cures, and remedy the condition for which the patient sought relief but slightly, for it is the wearing the truss, which is to him the disease, not the rupture. Of course, some cases of rupture are amenable to no operation whatever. In the same way some are kept up by no truss whatever; now these latter may be remedied in part by an operation which enables them to be kept up by a truss afterwards, but these are exceptions. What we want is an operation which will do away with both hernia and truss. Any operation which does not remove the sac cannot, I think, fulfil the conditions required. If left, its potentiality is too great; the invitation is too strong for the gut to descend, in spite of any sutures that may be in the way. How to remove it: It should, in my opinion, be ligatured as high up and cut as short as possible without opening up the canal, which, it must be remembered, is often only an opening; in any case, it is not long enough to require opening up in order to ligature the sac close to its origin. I believe there are very few cases indeed in which it is inadvisable to open the sac; in congenital cases it must be done to form the new tunica vaginalis. In strangulated cases it is of the utmost importance to wash away the products of inflammation in the sac before returning the gut within the belly, and neither history of the case nor condition of the patient is an absolute criterion of the state of the gut. In acquired forms, without strangulation, the operation proceeds more easily if the sac be opened. After ligation the butt end of the sac should be gently pushed up and left; in this way there will be no dragging, and the cut surface will glue on in what will be naturally the easiest

position. If the butt end be stitched into the ring, or to the walls of the canal, there must be some dragging, which will cause the beginning of a finger glove pouching, the invitation to the gut to descend. M^r Ewen, of course, to avoid puckering, strips up the sac so far that he can return it within the abdominal cavity. Again, in any stitching here the deep epigastric artery is always an element of bother and some danger. To close the external ring sufficiently to act as a barrier against the descent of the gut, and yet allow the free transmission of the cord, is the next indication. To suture the pillars of the ring together is to bring into apposition two edges, which Nature has obviously formed to be kept apart; no really solid union is likely to take place, as there is no reason for the maintenance of the such lymph as may have been induced by the presence of the sutures. I make an inverted V-shaped incision through the aponeurosis of the external oblique above the upper end of the ring, so that one leg of the V passes down on either side of the ring at about three lines distance from the margin, thus . The two-legged flap is turned down, leaving a lozenge-shaped opening in the aponeurosis, the margins of which are then sewn together with three silk sutures. The ring is thus diminished in size as much as is necessary by the approximation and suturing of the raw edges, leaving below the cord unpressed upon in any way. The opening is now sufficiently closed, and will be closed by the actual union of its edges, not relying on sutures at all, or lymph thrown out from slight irritation. Behind the upper half of this incision will be the butt end of the sac, which forms an additional buttress to the safety of the ring. There is no need to stitch the conjoined tendon, which is so often a very insignificant structure, to Poupart's ligament.

I have used this method in a number of cases now with very gratifying results. Some of these have been strangulated, some have had congenital sacs, in these the process of separating the sac has been more difficult, but the making of the new tunica vaginalis was followed in only one case by orchitis and this patient was suffering from gonorrhœa at the time his rupture became strangulated. The method is very easy of execution, except in some cases the stripping up of the sac, it is not complicated, it takes little time, not adding to the length of an operation for strangulation by more than a few minutes, and it relies on actual union of parts and not suturing, imitating the natural condition of no sac and a ring suitable for the transmission of the cord only.

With regard to the result of the operation, I have operated for hernia in the inguinal and femoral regions 27 times without a death, and rarely with any rise of temperature. The number of cases in which I have been able to follow up the result, as far as a radical cure is concerned, is few, but in these eight the results have been very good, as no truss is needed and no attempt at the return of the hernia has been noticed. Three of these cases were men in the fire brigade whose occupation entails sudden exertion such as would be liable to induce an hernia to descend again, but they have worked as usual after a month or five weeks without a truss and with no return whatever. On examination the ring feels like a normally small one and but for the slight scar hernia would not suggest itself to the examiner. There has been no such thing as atrophy of the testicles.

With regard to the propriety of operating, I believe that in a healthy man, with no strangulation, there is no danger to life whatever, there should be no rise of temperature or orchitis, and the procedure I have just detailed will, in all probability, result in a radical cure of the rupture, the patient

not having to wear a truss. The wearing of even a light truss is a mistake after the operation for radical cure. I may say I have not operated for radical cure on a very large inguinal hernia.

In femoral hernia I have always removed the sac as high as possible and also the gland in the vicinity, and have been content with this; in the four cases which I have been able to follow, this simple procedure has resulted in a cure, no truss being used. In umbilical hernia, I believe, the first important object is to get at the margin of constricting portion as soon as may be, and if there are products of inflammation amongst the contents to reduce as much intestine as possible before enlarging the incision for the purpose of dealing with the adhesions of intestine, if any, and with the omentum. This should all be cut away after ligature in many places, the butt ends replaced, the edges of them refreshed in places, when a purse string suture of very strong carbolised silk will be found, I think, the best way of closing the aperture. I sew the ring up with a continuous suture about half an inch from the edge and including the whole thickness of the parietes, this when pulled tight entirely closes the opening, the cut stumps are immediately behind ready to glue on to the now-closed wall, and in two cases of very large umbilical hernia with obstruction upon which I have operated the results have been excellent, a radical cure effected and nothing beyond an ordinary flannel binder worn since. In one case of enormous dimensions, without obstruction, in which I operated against my better judgment the patient died of shock. I had very great difficulty in returning several feet of gut which she had been accustomed to wear outside the general parietes of the belly for many years.

Before finishing I should like to recount one case of strangulated inguinal hernia in a young man who seemed in articulo, and whose scrotum was swollen as large as an infant's head and crepitant everywhere to the touch with the presence of gases of decomposition. After cutting through much thickness of gangrenous coverings I found to my surprise the intestine deeply congested indeed but quite returnable. In the intestinal walls could be seen the bases of two ulcers of the gut, each about the size of a shilling. The cause of the gangrenous condition all round was to be found in a gangrenous testicle. The sac was a congenital one, the patient had a gonorrhœal epididymitis which became gangrenous from the sudden pressure of the strangulated bowel. I removed testicle, sac, and cord, as high as I could, the patient passed through what appeared to be the later stages of enteric fever and eventually recovered thoroughly, although a confirmed drunkard.

Calculus impacted in the Lower End of the Ureter.— Removal. Recovery.

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MALE, *æt.* 21, has had evidences of calculus in the left kidney for six months. Occasional very severe attacks of colic. The last, three weeks ago, was the worst of all. Has had tenderness in the left loin; but no palpable enlargement of the kidney. Hæmaturia, visible to the naked eye two or three times, and with the microscope at others. He was sent into the Private Hospital in Wakefield-street, Adelaide, for exploratory nephrotomy.

On August 13th, Dr. W. A. Verco gave ether, and Dr. Hope assisted me. As a precaution, I sounded the bladder, to determine whether the calculus had descended the ureter. I did not touch a stone; but as there was very little urine in the viscus, I injected it through the hollow sound, and then succeeded in striking one on the left side. So a supra-pubic cystotomy was performed with the rectum distended. On introducing my finger into the bladder, instead of feeling a loose calculus, there was what appeared to be a sessile polypus springing from the left base, of the size of a filbert nut; but its free end was hard and rough. It was the renal calculus with its lower extremity protruding from the ureter, which was distended by it, and swollen around it, and projected into the bladder. There was much difficulty in removing it; I tried to seize the end of it with forceps, but so little of it presented that it was impossible to lay hold of it without including the end of the ureter; the patient was a very tall man with a deep pelvis, and to work at the base of the bladder with a knife was difficult and dangerous, but I laid hold of the ureter with forceps, and drew it up into the wound and incised it, and so released the stone. The patient's progress was uninterrupted. The large tube was replaced by a small one on the fifth day, and this was removed on the eleventh; water began to pass by the urethra on the thirteenth, and ceased to flow from the wound on the fourteenth. He had complete control over the urine at night on the nineteenth. Patient went home at the end of the month quite well, and has been free from all inconvenience since. The calculus weighed 8 grains.

This operation is so rare that it is deemed worthy of record. Morris, in the *British Medical Journal*, 1892, Vol. I, p. 1065, mentions five cases of ureterotomy for removal of calculi from various parts of the tube; but those of which I have been able to discover the records were removals through the incision for nephrotomy, or by an extension of this downwards. He also narrates two instances in which on autopsy after nephrotomy and nephrectomy, a calculus was discovered "at the vesical end of the ureter," and "projecting into the bladder from the left ureter" respectively. Berg, of Stockholm, found a calculus projecting into the bladder from the right ureter, in a woman. He tried without success, to remove it through the dilated urethra; so he had to open the bladder through the vagina, and with some difficulty extracted it with a small spoon. (See *British Medical Journal*, July 12, 1890, p. 125.)

This case furnishes several suggestions :—(1.) A rule to which there should be no exception. Nephrotomy should never be begun until (when the patient is under ether for the operation) the bladder has been carefully distended and sounded for stone. If the sounding is performed at any earlier date, the stone may have come down from the kidney since it was done, or it may have been in the ureter then, and impalpable, but have worked further down, so as to be projecting now into the bladder, and palpable. If the sounding has been effected without an anæsthetic, it is unreliable. If without a proper distention of the viscus, a small stone protruding from the ureter may be covered over by the folds of the collapsed bladder, and thus be missed. And the same thing may happen if it is lying loose at the base; and if it has just descended from the kidney, it must be a small one, and hence might be more easily overlooked. Morris suggests that in doubtful cases the bladder should be explored by the finger through a perineal incision of the membranous urethra; but, given the evidences of renal calculus, and no stone found in the bladder by careful sounding immediately before operation, it seems more reasonable to perform a nephrotomy and expect to find the calculus in the kidney. Besides, if after a urethrotomy has been performed, the stone should be recognised by the finger, it would be a very difficult matter to extract it. Berg could not remove his, working through a dilated female urethra. I do not think I could have managed mine through an opening in the membranous urethra; so that it would probably be necessary after its discovery by the median perineal incision to perform a supra-pubic cystotomy. I should, therefore, feel indisposed to recommend an exploratory urethrotomy.

(2.) Another point let me mention. It took half an hour to deliver this stone from the ureter. The difficulty was due to the way in which an attempt was made to draw up the base of the bladder towards the wound for incision of the ureter. Standing on the patient's right, naturally the forceps were passed by my right hand above the symphysis pubis into the wound, and grasped the base of the bladder in front of the ureter, but it would not come up, the trigone was too fixed. After a time I shifted the forceps to my left hand, passed it in at the upper edge of the wound, and seized the base of the bladder above the projecting ureter, and then it could be lifted up much higher, and was attacked more easily.

(3.) Again the incision should be made through the ureter over the upper surface of the stone, not along the under. There is a danger, it seems, of a ureteral fistula. Fatal drainage into Douglas' pouch has occurred. But the ureter runs for about three-quarters of an inch in the substance of the bladder wall, and there is, therefore, along the upper surface of the ureter an area of about half an inch which may be divided without opening the peritoneal cavity at the back of the viscus.

(4.) Can we diagnose a calculus obstructed in the ureter? In the present instance, after the last attack of renal colic, I inquired for symptoms of vesical calculus, but gathered that immediately after micturition, though there was no cutting pain at the end of the penis (as from a stone in the bladder), there was a pain deep-seated in the left lower abdomen, apparently felt in the region of the orifice of the left ureter. Possibly the contracting bladder drags upon the ureter, or compresses the stone in its lower end, and so occasions a definite discomfort. Futuro investigation may establish this as a diagnostic symptom; should this sign occur after an attack of renal colic, it may be taken as a hint that the stone has travelled thus far down.

Mr. J. W. Taylor, *British Medical Journal*, December 26, 1891, p. 1354, narrated two cases of calculus impacted in the ureter, which he had diagnosed

from the presence of a little painful tumour felt on vaginal examination in the situation of one ureter near its entrance to the bladder. In one of these cases the stone passed, with disappearance of the local tumour. In the other case the tumour still persisted. Mr. Kuowsloy Thornton in removing a left kidney from a woman by abdominal incision found a minute angular calculus fixed firmly in the ureter, just at its entrance into the bladder. He could not remove it, and thought it injudicious to open the ureter; so he removed the pyonephrotic kidney, and left the stone. He says, "she still has her stone, but it does not trouble her; though knowing now where it is, I can feel it per vaginam, and pressure on it causes pain to shoot up along the ureter." It appears, therefore, possible in women to feel the stone per vaginam, as "a little painful tumour in the situation of one ureter," and sometimes "pressure on it will cause pain to shoot up along the ureter." Might it not be possible to feel it in men per rectum, and to elicit the same subjective sensation referred to the ureter?

Surgery of the Kidney and Ureter.

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As one of the newer branches of surgery, it is desirable that the great field which surgical interference with the kidney opens up should be as widely discussed as possible at a meeting such as this present Congress.

Since 1869, when Professor Simon first removed a kidney for urinary fistula, we have become, year by year, more emboldened to interfere with this important organ; antiseptics and the resultant cleanliness and care encouraging us largely to do so. In this paper I have ventured to bring forward a series of cases which have all a bearing on this subject. They represent a series dealt with by myself. That there are others here who have done as much, or more, I am fully conscious, but it behoves every one to try to throw all the light possible on a subject of such great interest.

In the present state of our knowledge, until the kidney is reached it is almost impossible to say for certain what will be found to be the actual cause of the symptoms. In several cases supposed to be of calculous origin, although the symptoms seemed to point to calculus as the cause of the trouble, a twist in the ureter with a displaced kidney has really been found. Blood pus and mucus in the urine, with sharp attacks of pain both in the region of the kidney and the groin, have been noted in cases that were really displaced kidneys. There are two special indications of this condition which are a help in diagnosis—more particularly if present together—one is the diffused extent of the pain which is referred along the whole course of the last dorsal nerve and ilio-hypogastric nerve, and also extending even over the buttock. The other is the instant relief often obtained by the "inclined plane position," which permits the kidney to slip back to its proper place, and so undoes the twist.

Periodical discharges of pus mixed with blood, which was looked upon as a well-marked symptom of abscess in the kidney, have occurred frequently in the cases of displaced kidney and perinephritis. In case 13, the urine was constantly examined for mouths and this condition frequently found, but there was never the smallest stone detected. It has been said that this is due to the after effects of the passage of stone, but in case 13 a most careful watch was kept for anything of the kind, but nothing was ever found. The pain in these instances can be accounted for by the tension in parts above the twist in the ureter, which become dilated by the secretion of urine above. The blood is probably due to congestion of the renal vein, which must also be twisted so that the return of blood is partially prevented, whilst the pus is probably the outcome of a catarrh or pyelitis from repeated attacks of congestion. That this is a frequent cause of hydronephrosis cannot, I think, be doubted. At the present time I have under observation a lady whose kidney becomes as large as a cocoanut when displaced, but she is not willing to undergo operation at present.

In the three cases of stone in the ureter, pain just above and behind the pubes has been very marked. This was explained by the situation of the stone low down in the ureter, the lower end of the tube being supplied with nerves from the vesical plexus.

I will begin the series of cases operated on with four instances of displaced kidneys.

Case 1.—The first case is Mrs. R., in whom a tense ovarian cyst was diagnosed and abdominal section performed. It was found that the right ovary was healthy, but the right kidney was displaced behind Douglas' pouch. It could be slipped back behind the peritoneum to its proper position, but had not a mesonephron. The case occurred some time ago, before I knew the value of nephrorrhaphy. An attempt to excite exudation by rubbing the kidney against the surrounding tissues, and so fix it in its proper position, succeeded, until the violent coughing in an attack of pneumonia, two years later, partially displaced it again. It has never descended below the brim of the pelvis since it was replaced. It exactly resembles Mr. Duncan's case, quoted by Mr. Morris in his work on Diseases of the Kidney.

Case 2.—The patient, a strong healthy young man, was thrown from his horse nineteen months previously—in bed for eight months, with pain in left leg and feeling of crick in the back on movement. Three weeks previous to my seeing him, severe attack of pain like renal colic—but localised, did not shoot in any direction. When first seen, severe pain in left side and groin, with feeling of weight and oppression in lumbar region and tenderness on pressure. Pain was relieved by "inclined plane position," swelling felt, operation by Langenbuch's incision; kidney rotated across spine, twist of ureter; stitched in xi space by large perinæum needle and thick silk. Cured.

This was an instance of what Mr. Morris designates as the "sifting movement" of the kidney. Langenbuch's incision was chosen, as there was some question whether the swelling might not have been due to a new growth. This was the first instance in which I anchored the kidney to the back by passing a needle through the lowest intercostal space. By using the hand inside the abdomen to hold the kidney in position, and also directing the needle through the kidney from back to front, I was enabled to fix it very firmly. This patient played leap-frog five weeks after the operation.

Case 3.—Miss M. M. injured her side in June, 1890. This was followed by pain and inflammation all down left side; severe throbbing pain compelling rest in bed for six months; pain accompanied by changes in urine, which is less in quantity up to a crisis of pain, followed by discharge of thick urine; invalided throughout 1891; urine, acid, blood-stained, with amorphous urates, and crystals of uric acid; flat and pear-shaped epithelium cells but no casts; pain brought on by movement; severe attacks usually every three or four days; side hard, dull, and excessively tender; delineates the course of last dorsal, also ilio-inguinal and ilio-hypogastric nerves by situation of pain, extending sometimes down thigh; lame, and cannot hold up without bending hip; urine 1892, acid 1020, lithates, no albumen, no blood, but on occasions a specimen of the urine consisted of about a quarter thick blood-stained deposit; lumbar operation; the upper end of kidney passed with respiration completely below line of incision; two silk stitches were passed through two lowest intercostal spaces; fixation of the kidney gave complete relief for some months, but a long day's outing with driving has brought back some pain, the kidney having become partially displaced again.

Case 4.—The last case is interesting from the length of time the symptoms had been present. It was that of a boy aged 19, who had had pain in left loin as long as he could remember; worse if jolted; pain burning, then

shooting in character; frequency of micturition; urine acid, 1023, with albumen; red and white blood corpuscles; no crystals; sometimes only 3xx of urine were passed a day; sent by Dr. Scot Skirving for operation. Kidney incised and calices explored; wound in kidney stitched up; kidney fixed to parietes by two silk ligatures through the lowest spaces; quantity of blood in urine for days after, but no secondary hæmorrhage. This boy was under medical treatment for a long time; blood-cells, red and white, were frequently found after attacks. The kidney was displaced below the incision in loin, but was thoroughly examined by being brought to surface and incised. High temperature for days from tension, but no suppuration; without evident cause collapse and subnormal temperature, but did well.

Two cases of pyonephrosis for which nephrotomy was performed, and a third for which nephrectomy was done.

Case 5.—The first, that of a woman aged 22, who for two years before admission to the hospital had had aching throbbing pain in right side. This returned every four or six weeks; pain at times shooting round to back; latterly so bad unable to leave her bed; swelling in right loin with urgent symptoms; nephrotomy September 5th; examined again in October; no trace of calculus; complete recovery, probably tuberculosis.

Case 6.—The second, a man aged 38, who had had attacks of renal colic since 1868; always produced if beer or spirits taken; invalided from Soudan, Christmas, 1886; very bad attack, with large hæmaturia; various severe attacks in 1887; pain maddening on left side, shooting to groin; vomiting; urine during attack decreased, followed by discharge of very foul-smelling urine-matter in it; on admission urine acid, specific gravity 1023, albumen, large amount of pus and phosphates; nephrotomy. January.—Examined under CHCl_3 for calculus, but not found; calices becoming healthy; opening gradually closed. February 26th.—Urine healthy; abscess reformed, and discharged by bursting through wound; refused to have nephrectomy done; since then has been well; abscess not having reformed; doing his work cleaning tram cars.

The former was thought to be tubercular, the latter probably calculous in origin. In both, the kidneys seemed to the finger merely irregular sacs, in which it was impossible to decide which pouch really was the ureter.

The point of special interest here is the fact that both closed perfectly without the risk that removal of the kidney would have entailed. These cases raise the question whether it is advisable to proceed to immediate nephrectomy, even when large abscesses are present, *provided that* the abscesses open freely into the pelvis and thus allow of drainage.

Case 7.—Case 7 is that of a woman, the mother of four children, who also had four miscarriages. Three days after the third miscarriage, $2\frac{1}{2}$ years ago, she had pain in passing water with incontinence, thought to be due to cystitis. This continued in spite of treatment, and in May, 1890, the urethra was dilated to examine the bladder, but nothing was found. In October she began to have spasmodic attacks of pain about every three weeks, but she never passed a stone. Abdominal section was performed, and a thickening of the lower end of the ureter was the only pathological condition found. Pus was noticed in the urine about this time. In July, 1891, she had another miscarriage, after which it was noticed that the urine *did not* flow freely, and then there was severe pain in the left side, which appeared

to run down to the bladder. (? Suprapubic pain.) The pus was chiefly noticeable after these attacks. Previous to this illness the patient had always been in good health, and her family history is good.

A swelling of the left kidney was next noticed, coinciding with the attacks of pain and the discharge of pus. She was admitted to the Prince Alfred Hospital, and I operated on September 21, 1892, by the loin incision. The kidney tissue was replaced by a number of abscesses shut off from one another. I passed an uterine sound, straightened, with a slight bend about $\frac{1}{2}$ in. from the end, up the ureter to the kidney from the bladder by Dr. Biffard's method, as the ureter could be felt by the side of the cervix. The ureter was so thickened by surrounding inflammation products that it felt like the aorta. After much difficulty I separated it, and the sound was of great assistance here. By thus separating the ureter the size of the pedicle was considerably reduced. The pedicle was tied off by a Staffordshire knot, with a circular ligature nearer the aorta, and the kidney removed.

Here I would remark that it is much easier to differentiate the ureter 2 in. below the kidney than to seek it close up to that organ. If it be attempted close up, the various layers of fine fasciæ which bind the fat in layers around the kidney, and which become thickened around an inflamed kidney, are almost sure to be more or less stripped up from one another. This leads to a good deal of oozing, and at the same time they are rather puzzling to the operator, but if the ureter is long at one side then it is much more easily reached.

The two following cases are instances of perinephritis:—

Case 8.—The first, that of a boy, whose illness began with a sudden onset of pain in right lumbar region, throbbing in character, vomited same night, pain extended over side, right leg flexed and too painful to move, flexion increased, swelling appeared in lumbar region, no history of injury, large perinephritic abscess opened. Cured.

This is an instance of rapid formation of a perinephritic abscess without any evident exciting cause to be detected; the kidney lay in a sac of pus.

Case 9.—The second case was not so clear, and calculus was suspected until the kidney was exposed. The history is as follows:—The patient, a very stout man, suffered from his first attack in January, 1891. He then had severe pain, with inability to pass water, followed by constant pain in side with vomiting. Attacks in May and November, 1891; also March, 1892; urine acid, bloody, and high coloured; sediment very red, not gummy; never any gravel; pain shooting to left groin and testicle; pain along last dorsal nerve and outer part of thigh; near knee, spot large as palm of the hand, numb and pricking; August, 1892, very painful spot over pectineus muscles below Ponpart's ligament; when he stoops he commences to vomit; wife thinks quantity of urine diminished during attacks; operated on August, 1892; general perinephritis; capsule adherent in all directions; no stone; kidney difficult to reach; suppuration from bruising of the fat, but the pain is relieved.

I now come to three anomalous cases:—

Case 10.—The first shows what immense suffering a small, hard stone in a kidney can cause, and it is also another instance of pain after many months' suffering being referred to the opposite kidney. His case is that he had pain during micturition, with inability to hold water longer than twenty minutes to one hour, for months before his admission to the hospital; pain about the navel; cramp like "pulling his entrails out"; cystotomy; this gave

no real relief; R. Langenbuch to examine kidneys; nothing detected, but gall bladder found curled on itself, and distended; stitched to side; temporary relief; urinary trouble returned again and again; pain in back incessant, blood reappearing from time to time, lasting sometimes for weeks; in October, 1890, small pieces of calculus passed, yellow colour; some scraps every week for a time; pain latterly referred to left kidney; examined by Langenbuch's on that side without result; did well for three days; then rigors, peritonitis, and death; *post-mortem*; very small, hard calculus in lower end of right kidney.

Case 11.—The next case is that of a labourer, aged 40, who strained his back, six months before, lifting a stone. This was followed by swelling of testicle, which subsided under treatment; urine thick and white, but passed easily; under medical treatment for severe attacks of colic in renal region, with feverish attacks; urine contained pus; January, 1891, nephrotomy; kidney incised, and calices examined with fingers; nothing found; three attacks of secondary hemorrhage; at convalescent hospital; nodule in testis enlarged; fungated; testis removed; cured.

A combination of pyuria and orchitis; was one of the most puzzling of the series. He was under treatment in the medical wards for some weeks, and had several attacks of supposed renal colic. He was then sent on to me for operation. From the history I quite expected to have found calculus or abscess of the kidney. After the operation the urine was almost as bad as before, and he had several attacks of pain, though, on the whole, the pain was considerably relieved. He came back from the convalescent hospital, with fungus testis of the same side. As soon as that organ was removed the urine cleared at once, with complete relief.

In this case I made the incision across the anterior surface of the kidney from the hilus outwards, and inserted my finger. Although there was not much hemorrhage at the time, there were three attacks of secondary hemorrhage; two very severe. Eventually it was stopped by plugging, but it is an incision which I shall not use again.

Case 12.—One of those curious cases in which nothing is found, although the symptoms are marked, but in which operation gives complete relief. A tubercular-looking man, but a boiler-plate striker by trade; first noticed smarting pain in micturition seven months before, with terrible pain in back, preventing sleep at night; incontinence of urine at times; at times urine is acid, with pus and blood; lately, March, 1892, ammoniacal, and loaded with mucus 1,018 scalding; for last month gummy deposit; pain severe in urethra whilst passing; frequently some scalding water drops down thighs; no special pain on movement or in train or bus; has not had suprapubic pain; no vomiting; very stiff in back in morning; no calculus in bladder; vesiculæ seminales large and vas big; kept at rest in bed for three weeks; losing ground fast; pain in back bad; kidneys examined by L.'s section; nothing abnormal felt; temperature normal; August 29, 1892, very well, and has lost the tuberculous look. Tuberculosis of the kidney was suspected, and Langenbuch's incision was used, that the other kidney might be examined, but nothing was found; relief of all the symptoms, however, was obtained. This case is the more puzzling, as, unless a small abscess which was not detected was burst by the handling, one cannot see why he should have been relieved. What can give relief in these instances I cannot quite see, unless the operation acts as a violent counter irritant, for none of the nerves of the loin were interfered with.

Leaving the kidney cases proper, I come now to four that have reference to the ureter:—

Case 13.—J. B., aged 37, was operated on years before for “right psoas abscess” by Sir J. Lister; calculi passed by wound months after; healed; *suprapubic pain* began in 1886; hæmaturia in 1887; no pain in penis; hectic temperature; no stone on sounding; cystitis; perineal section for pus and mucus in urine; improved; left hospital September, 1887; four days later violent pain in left kidney region; total suppression of urine, with swelling in left loin; death, without operation.

This is an instance that occurred before any attempts had been made to reach stones in the ureter. By the light of modern practice an attempt would be made to reach it. The case, however, led me to consider the possibilities of such a procedure. The *suprapubic pain* was very marked.

Case 14.—J. J., aged 52, was crushed in a mine in 1878, and was laid up for twelve months; he had pain in right hypogastrium for seven years; frequent micturition began in March, 1888; pus in urine with mucus; never blood or calculus; cystotomy was performed for cystitis, but without relief; he continued to have pain low down near the bladder, with *suprapubic pain* as a marked symptom; after a very severe attack one night, in 1891, followed by great relief, the stone, in passing water, became impacted in the urethra, from which I extracted it; it was the size and shape of a very large almond, moulded to the ureter; since then he has been quite free from pain.

Case 15.—The third case is that of a boy, who had intermittent hæmaturia, and at first pain in the right loin with *suprapubic pain* as a marked symptom; on sounding there was no calculus in the bladder, but there was a quantity of pus and deposit in the urine, which was acid, Sp. Gr. 1018; pain was afterwards referred to left kidney; examination by Langenbuch’s incision, calculus was impacted in right ureter; operation, as for ligature of right iliac artery; removal of calculus from ureter; recovery.

Although this has been reported in the Clinical Society’s Transactions, 1890, I have brought it forward as it is a clear instance of pain referred to the opposite side, later in the disease; it was the desire to examine both kidneys by one incision that led me to choose Langenbuch’s operation; I consider myself fortunate to have detected the stone in the ureter, and to have been able to reach it from the outside.

In the *International Medical Journal*, January, 1892, Dr. Cabot, of Boston, has collected all the known cases of removal of stones from the ureter, and referring to this case he contends that the external incision adopted here would not be feasible in an adult; *post-mortem* I have followed the ureter well into the pelvis by increasing the length of the skin and muscle incision, to allow of the bowels being drawn well across; and with the rectum distended, as for suprapubic lithotomy, I believe that it is possible to reach a stone in the lower end of the ureter—at all events in thin subjects.

Stitching the wound in the ureter might be impossible, but the consensus of opinion in London was that that was not necessary, for it must be remembered that aseptic urine has not the baneful influence on the tissues that was formerly ascribed to it. [See B.M.J., February, 1890.]

Case 16.—The fourth ureter case is that of C. B., 29, who had experienced difficulty in micturition for fifteen months; rapidly becoming worse; when seen in March, 1892, a soft swelling was detected by sound; growth suspected; suprapubic cystotomy, dilated ureter, cystitis, perineal section, becoming worse; nephrectomy and dragging up of ureter; special case for Congress.*

* Vide p. 313.

Regarding the method of operating, it will be noticed that Langenbuch's incision has been made use of on several occasions. It certainly has the advantage of allowing of the examination of both kidneys. That this precaution is not an unnecessary one, was shown very clearly in a case that died lately from paralysis, in which one kidney was found to be reduced to a curdy mass without a single symptom pointing to renal trouble. It was used in case 8, where the pain was referred latterly to the opposite side to what it had been previously; again in case 10, with the idea of examining the ureters; in case 2, when new growth was suspected; and in case 12, when from the man's appearance tuberculosis was suspected; in case 13, to examine both kidneys. I cannot recommend it generally, for it does not allow of so thorough an examination of the kidney, whilst it certainly increases the risk; but it has the great advantage of enabling the ureters to be traced throughout their course. The usual loin operation with an incision parallel to the last rib and a finger's breadth from it, does not give sufficient room if the kidney lies high; but I found that splitting the fascia lumborum upwards by a cross-cut gave more space than Mr. Morris's incision in the skin upwards over the ribs. I failed to bring the kidney to the surface, as done by Mr. Morris, until the patient was rolled nearly on his back, and even then if the pedicle be short it is no easy matter.

In stitching the kidney I used a method that is open to objection, viz., that the pleura is possibly interfered with, but provided the needle and silk are aseptic it should not cause more than an adhesion of the two surfaces at that part. It has the advantage of spreading the points of support, and at the same time fixing the kidney more accurately in its proper position under the ribs. The usually accepted plan of stitching the lower end only by catgut sutures allows the upper end to be pushed down and forwards if the kidney be really mobile. Three cases of course are not sufficient to argue on, but I have had no trouble from it. It further enables the needle to be passed through the kidney from back to front, thereby ensuring a much larger surface of the kidney being closely applied to the parietes, with the probability of better adhesions forming. At the same time it leaves more kidney substance between the sutures. The extended incision downwards in case 10, to the iliac crest, parallel to the edge of the quadratus lumborum, which was made with the intention of enabling me to separate the ureter along its course as far as possible, was most successful. By that means the ureter was entirely separated for at least 2 inches below the brim of the pelvis. At the same time it allowed of ample room to reach the kidney, which until then was most difficult, owing to the shortness of its pedicle, and the height at which it was lying under the ribs.

These are but the experiences of an individual in a comparatively new domain of Sydney. We are learning our lessons step by step—often with much labour and pain, but these few remarks may I trust be thought not unworthy of Bacon's expression—

“Only a Grammar School text, but worthy of a wise man's consideration.”

Obstructed Micturition.—Congenital Dilatation of Ureter.—Nephrectomy.

G. E. TWYNAM, M.R.C.S., Eng., L.R.C.P., Lond.

Hon. Surgeon Prince Alfred Hospital, Sydney.

C. B., aged 22, a clerk by profession, not a strong-looking man, was sent to me in March, 1892, by Dr. H. Browne, complaining of difficulty in micturition; he had never been ill until the present trouble. This began fifteen months previously, when he noticed a difficulty, the act taking a long time owing to the intermittent character of the stream, which, however, was strong, and came in squirts, and this condition was becoming more pronounced. He first consulted Dr. Browne in February, being anxious about the continued difficulty and straining; a catheter was passed, and a large quantity of urine drawn off, although patient had passed urine shortly before. There was no history whatever of renal colic. He complained of a pain in the bottom of the stomach on the left side, with straining in micturition; there was decidedly more pain on the left than on the right side, but the pain was only when passing water, which was unduly frequent by day, only rarely disturbed at night; the pain was most severe just *before* the water passed, continuing throughout the act, and ceased after. On 21st February, 1892, having had retention for fifteen hours, he woke in the morning and passed blood only, which was the first time he had done so; he had to have water drawn off then, but no instrument had been passed for ten days previously; the bleeding continued from Saturday morning until Monday afternoon following; patient had never noticed any pus in urine. When seen by me on 4th March, a No. 10 sound was passed into the bladder, with a direction to the right; there was slight swelling of the prostate, but not much; behind it on the left side a swelling was to be felt extending over the trigone on that side, but the beak of the sound could be inserted into a pit between it and the prostate; there was no stone and no abscess; a soft growth was diagnosed, and he was admitted into the Prince Alfred Hospital; the urine then was—acid, 1018, slightly turbid, no albumen or blood. On 16th March, the patient being under ether, the bladder was examined per rectum, and far up a soft elastic swelling was felt as large as a mandarin orange, situated opposite the left iliac synchondrosis similar to a large pouch of the bladder, but clearly part of that viscus. The diagnosis before operation was a hydatid or a very soft tumour. Suprapubic cystotomy was then performed, the bladder being held up by a ligature on either side of wound, and on inserting the finger the bladder was felt to be larger than normal, but no stone was found. Instead, a soft smooth funnel-shaped swelling projecting well into the bladder, with a large opening at the apex big enough to admit the tip of the forefinger easily, was made out, but no enlargement of the prostate. The incision was extended upwards as far as the peritoneum could be reflected, and the sides of the wound retracted. It was then recognized that the opening was the orifice of the left ureter, by the circular muscular fibres forming a clearly marked sphincter. The right

ureter was but slightly larger than normal; the forefinger could be passed into the orifice of the left ureter, and moved about in all directions, but the bottom of the dilated portion could not be reached. A sound passed in every direction could not detect a stone anywhere in it. This funnel-shaped process of the ureter was so loose in its attachments—for it raised the trigone of the bladder with it—that it could be drawn easily over the orifice of the urethra, and could also be drawn up into the skin wound, so that the circular fibres of the orifice could be plainly seen largely hypertrophied; when the pouch was emptied the swelling felt per rectum was lost. This pouch, when full of water, was forced down over the orifice of the urethra, and caused the obstruction; with the finger in the pouch the parts were freely rubbed about on the surrounding parts to produce inflammatory adhesion if possible. A small sessile nodule felt on the wall of the pouch was scraped off with the finger-nail, but under the microscope proved to be only normal tissue; a double drainage tube was placed in the bladder wound, but no stitches were inserted; as all urine escaped by the suprapubic wound, the dressings had to be changed very often. Every endeavour was made to keep the bladder aseptic, for the seriousness of a possible septic condition in this case was fully recognised. The bladder was irrigated daily with Boroglyceride solution. The tube was removed on 27th March; the patient's condition was good, and he never had a rise of temperature above 100° F. throughout. By 4th April, nineteen days after the operation, the suprapubic wound was closed, all but a small fistula, but he could pass no urine by the urethra.

On April 5th he was got up and tried to pass water standing, the finger being pressed over the wound; however, most came by that opening, only a little by the urethra, but it was turbid and foul, evidently having remained in the bladder for some time.

On April 6th it was noted that the urine by the wound was clear and did not smell, but the little by the urethra was foul, evidently the "dregs" left in the bladder. He continued thus until the 8th, when he passed a fair quantity by the urethra, but that night he had a slight rigor 101°, which was the only rise he had. The bladder was washed out daily, and the urine on April 18th was neutral, sp. gr. 1.018, little albumen, but with a dirty white deposit, consisting chiefly of pus, epithelium and amorphous phosphates. By the 24th it had become acid, and there was no albumen, but a good deal of deposit still remained.

By May 3rd there was still a little urine coming by the suprapubic opening, but nearly all came by the urethra. As he had been in hospital some time, it was thought that a change to his home would do him good, and he accordingly left the hospital. I regret to say that the change did not prove beneficial, for his cystitis increased, in spite of treatment, until the urine contained a large amount of pus and mucus—and also some blood from straining—whilst micturition was very frequent and painful. During this period he took saccharin, naphthalin, eupatorium purpureum and pot. citr. and buchu, but without any good effect. I therefore recommended his return to the hospital.

He was readmitted on June 6th, 1892, his condition then being very unsatisfactory, micturition very frequent, with burning pain, the urine always blood-stained, and always preceded by some "matter," and frequently after straining small blood-clots were seen. I then did a perineal section to drain the bladder and allow the suprapubic fistula to close. The bladder was washed out through the tube, and the lotion returned clean after a time,

but it was found that although the bladder proper was clean, he could always, on straining, pass some dirty foul urine when the bladder was believed to be empty. This evidently came from the sac. It was impossible to pass a tube into the pouch to wash it out or empty it, and some residual urine always remained in it, similar to what happens in enlarged prostate cases, as the pouch extended below the orifice of the urethra. Under the circumstances, I looked up authorities, but could only find a note in Holmes and Hülke's system of surgery that such a congenital condition had been found *post-mortem*.

On July 29th we held a consultation on the case, for the man was evidently going down hill fast, for he could get no sleep, his appetite was bad, and his temperature frequently reached 101. The destruction of the pouch was the one object to be aimed at. To do this it was necessary to prevent the water coming down from above by removal of the kidney on that side, when by drawing up the ureter the dilatation might be partly destroyed and eventually become a fibrous cord. If it could not be drawn up it was thought possible to irrigate through it with a fine tube for a time. This was explained to him and he assented to the operation.

Accordingly, on August 3rd I operated. An incision 5 inches long was made parallel to the last rib and a finger's breadth below it. When the fascia lumborum was divided the kidney fat protruded with the wound, covered by a fine fascia that looked very like peritoneum. This was divided and the fat beneath separated with the fingers until the kidney was reached. Only the lower end could be felt, as it was lying high, and I had great difficulty in separating the surrounding parts from it, so much so that the incision had to be enlarged, which was done in a downward direction parallel to the edge of the quadratus lumborum down to the crest of the ilium, it being my intention to bring the ureter out at that point. This gave a great deal more room and enabled me to pass nearly all the hand in to free the top of the kidney, but even then it could not be brought out on to the surface of the loin, as suggested by Mr. Morris, owing to the shortness of the pedicle. Next, the ureter was sought for and divided between two ligatures an inch below the kidney, which helped largely in freeing the pedicle. A silk ligature was passed through the centre of the pedicle, and tied off in two portions. After this a stouter silk ligature was passed round the kidney, the ligature on the upper end of the ureter, and the two on the pedicle, being drawn through the loop, so that one was certain that the last ligature was nearer the aorta than the two previous ones. The division of the ureter first in this way allows the silk to sink into the vessels more surely, and removes one chance of the ligature slipping after the pedicle is cut through, if the ureter is left as part of the pedicle. The lower end of the ureter was then traced and separated from its surrounding attachments as far down as possible. In this case I freed it to $1\frac{1}{2}$ inch below the iliac vessels until the beginning of the dilation was felt. It was then pulled up very firmly and drawn out above the iliac crest in the lower angle of the wound and stitched firmly to the skin outside and also to the cut surface of the muscles, so as to anchor the pouch and the back of the bladder to the wall of the pelvis, and by the traction reduce the size of the pouch. The triangular flap was laid down and the wound stitched with gut and horse-hair sutures, a rubber drainage-tube being inserted.

August 4th.—Patient passed a quiet night without much pain or sickness; he passed $\bar{3}$ xviii of urine by 8 a.m. next morning, and $\bar{3}$ xii more in the next twelve hours; temperature at 8 p.m., 100.4.

August 5th.—Has passed 3 xxxviii in last twenty-four hours with a good deal of irritation and pain, and the perineal wound has been reopened. Temperature under 99°; some puffiness under the flap; tongue furred; pulse rapid, but good.

August 6th.—Vomiting ceased, and taking food well; urine for twenty-four hours 341, still turbid and foul.

He passed 330 to 340 daily, but his temperature rose slightly each afternoon. On dressing the wound on 12th August, a little pus with, however, no urinous smell, escaped, and a small abscess under the flap was opened and a tube put in. From this on he began passing very large quantities of urine—366, 361, 366, 364, 362—the urine improving in character daily. All blood had disappeared, and there was not more than half the quantity of phosphates and mucus, whilst he was only disturbed once or twice at night, and by August 20th there were only two small sinuses left where the drainage-tubes had been; appetite was better, and he was improving generally; the temperature having been normal since the 13th instant.

The condition of the ureter in this case was a most unusual one, and dilatation of the lower end only of one ureter seems to point to its being a congenital condition. It is not to be explained by the impaction of a stone nor by the stretching of the ureter that takes place from obstructed micturition as ordinarily understood. There was no history of stone, and none was found. If it had been from obstruction the ureter should have suffered throughout its length, but above the brim of the pelvis it was normal and healthy, and the kidney after removal was perfectly healthy. I was extremely loth to remove a healthy organ, but under the circumstances I could see no other means of properly dealing with the condition found.

When examined on September 15th, 1892, the pouch, though still to be felt, was much smaller and its walls were thickened considerably, but there is still a central cavity. Showing that a marked change has taken place, and although the urine is not yet clear, the patient is up and about. He can pass water now freely without pain or difficulty, and is not disturbed at night, and his general health has improved.

September 29.—Urine, to-day, acid and clear without offensive smell. It will be some weeks yet before it finally shrivels and becomes obliterated, but I thought it a case of sufficient interest to bring before you.

DR. NASH'S MAP OF DISTRIBUTION OF CALCULUS IN AUSTRALIA.



The Distribution of Calculus of the Bladder in Australia, and the Methods of Treatment Adopted.

J. B. NASH, M.D., Edin., M.R.C.S., Eng.

IN the beginning of the year 1888, when preparing an M.D. thesis for presentation to the University of Edinburgh, it occurred to me that some investigations with the view of getting an idea as to the prevalence of "the stone in the bladder" in Australia, would be useful and interesting to the surgeon and general practitioner; to this end I made inquiries from the different city and provincial hospitals. The result was published in the December, 1888, number of the *Australasian Medical Gazette*.

For the purpose of a paper before the surgical section of the Congress, the investigations have been pursued for the four years—1888, 1889, 1890, and 1891. This brings our information on the subject down to date from the year 1878, or a period of fourteen years. Necessarily the knowledge gained is not perfect, but on the whole it may be looked upon as giving a fair idea of an interesting and important disease from the point of view of both the person who suffers from it and the surgeon who has to treat it. The same course has been pursued in the present as on the former occasion, *i.e.*, circulars were forwarded to the medical officers attached to 182 hospitals, scattered over the length and breadth of Australia and Tasmania. They were asked for the number of cases treated during each year, the variety of operations adopted for the relief of the patient, the variety of calculus removed, and the city or district from which the sufferer came.

From New South Wales, where there are 80 hospitals, the replies number 35; from Victoria, where there are 35 institutions, the replies were 22; from Queensland, with 38 hospitals, 11 gentlemen provided the required information; from South Australia, where there are 11, as many as 4 replied; of 7 places in Western Australia only 1 answered; while the 4 hospitals in Tasmania were good enough to answer me. My best thanks are due to the medical gentlemen who have taken the trouble requisite to fill up the columns in the circular, and in this place I tender it to them.

The answers are fairly numerous, and it may be granted that the disease is hardly known to exist in the districts from which no replies have come, or, if it does occur, the sufferers have undergone treatment in some other part of the country. The results confirm the statement which I made in 1888, *viz.*, that the affection is met with over all the colonies. In 1888 I ventured an opinion, in view of the information to hand, that there was an area in Victoria, in the neighbourhood of Sandhurst, Castlemaine, Kyneton, and Ballarat, where the disease was especially common. This would again appear to be the case, as the proportion of cases to the whole population in the Cities of Ballarat, Bendigo, and Geelong, is 1 case for every 20,472 inhabitants annually (1 to 20,472:57). Outside this region the disease would appear to be distributed over a wide area of the continent. In New South Wales stone has been known to occur in 19 different places, some of them widely separated from one another; in Victoria in 10 cities and towns; in Queensland in 6 well populated localities; in South Australia in 4 towns; and in Tasmania in 4 different centres.

In a tabulated form will be seen under the headings of the separate colonies, the names of the cities and towns in regard to which I have been able to get information. The table is compiled from the last question asked in my circular, and has been obtained from the addresses, kept in the hospital records, of the patients who were operated on. I have no exactly corresponding data for the 10 years ending 1887, as I did not then seek the name of the city or district where the patients resided prior to being operated upon, but contented myself with knowing in what hospital the operations took place:—

PLACES where Vesical Calculi occurred.

New South Wales.	Victoria.	Queensland.	South Australia.	Tasmania.	Western Australia
Thirty-five replies reporting fifty-eight cases—	Twenty-two replies reporting seventy-five cases—	Ten replies reporting twenty-five cases—	Four replies reporting nine cases—	Three replies reporting sixteen cases—*	One report.
Bathurst 1	Ararat 2	Brisbane 15	Adelaide 6	Hobart 11	Two cases from Western Australia were operated upon in Victoria
Braidwood 1					
Bulli 1	Ballarat..... 8	Cloneuray... 1	Gumeracha.. 1	Launceston.. 3	
Candelo 1					
Cudgellieo..... 1	Bendigo 7	Maryborough 3	Jamestown .. 1	Deloraine ... 1	
Hay 1					
Kangaroo Valley 1	Bright..... 1	Roma 1	Kooringa.... 1	Ringarooma 1	
Macleay River.. 1					
Newcastle 5	Creswick 6	Toowoomba 1			
Merriwa 1					
Narrabri 1	Geelong 6	Townsville .. 3			
Nyngan 1					
Pictou 1	Gippsland.... 3				
Parramatta 1					
Raymond Terrace. 1	Melbourne .. 35				
Singleton 1					
Sydney 36	Portarlington 1				
Wellington 1					
Yass 1	Warnambool 1				

* Note.—In addition to the above, one suprapubic operation was performed in Victoria on a patient who came from Tasmania (op. in 1889).

An idea of the work done in the decade ending with 1887, and the four years ending 1891, may be gained by comparing the annexed tables, which show the number of operations performed in hospitals situated in the towns and cities named.

It is evident that, with the increase of population, the number of stone cases has also been augmenting, as in New South Wales, for four years, 58 cases, or an average of $14\frac{1}{2}$ ($14\cdot5$) cases per annum have occurred, while in the ten preceding years the average had been about 9, with a total of 91. In Victoria, during the recent four years, there have been nearly 19 cases annually, while in the anterior decade the number was not quite 9 per annum. In marked distinction to the other colonies is South Australia, where the population has been increasing at the rate of 3·12 per cent. annually, the number of cases in each year has decreased from an average of $4\frac{1}{2}$ to $2\frac{1}{4}$. Nor can this be accounted for by a diminished number of replies to my circular, as they have been equally as numerous this year as in 1888; but the cases seemed to have been fewer in Adelaide, and in the Adelaide Children's Hospital, and in Kapunda.

In Queensland, the average for the four years has been $6\frac{1}{4}$ cases. This I cannot compare with previous records owing to their being so scanty, and thus not giving a fair view of what then existed.

In Hobart, with its population of 33,450, $2\frac{1}{4}$ cases have been stated to me as occurring every year. This is a large proportion, and is a considerable advance on an average of less than one case for the preceding period, and is not to be accounted for by an increase in the population, which has only been at the rate of 1·63 per cent. per annum.

PLACES where Cases were treated for decade, ending 1887.

New South Wales.	Victoria.	South Australia.	Queensland.	Tasmania.	Western Australia
Sydney—	Melbourne—	Adelaide—			
Sydney 55	Melbourne 31	Adelaide .. 23	Maryborough 2	Hobart 6	Nil.
Prince Alfred 22	Alfred..... 19	Children's .. 22	Townsville .. 1		
Sick Children's 1	Sandhurst .. 13	Kapunda 7	Bundaberg .. 1		
Newcastle 11	Castlemaine 4	Burra Burra 1			
Forbes 2	Kyneton 5				
	Hamilton .. 4				
	Daylesford .. 3				
	Ballarat 4				
	Clunes 3				
	Sale 3				
Totals.... 91	89	53	4	6	Nil.

PLACES where Cases were treated for four years, ending 1891.

New South Wales.	Victoria.	South Australia.	Queensland.	Tasmania.	Western Australia
Sydney—	Melbourne—	Adelaide—	Brisbane—		
St. Vincent's.. 5	Childrens' .. 24	Adelaide .. 7	Brisbane .. 13	Hobart..... 11	Nil.
Sick Children's 8	Alfred..... 10	James Town 1	Children's .. 5	Launceston.. 5	
Sydney 10	Melbourne.. 12	Koorunga .. 1	Townsville .. 3		
Prince Alfred 22	Ballarat 8		Toowoomba.. 1		
Newcastle 9	Geelong 6		Maryborough 3		
Hay..... 1	Bendigo 7				
Parramatta 1	Creswick 6				
Yass 1	Arrarat 2				
Singleton 1					
Totals.... 53	75	9	25	16	Nil.

If we work out for the year 1891 the number of cases to the populations (as given in Mr. Coghlan's "Seven Colonies of Australia") we get the following proportions by averaging the number for the four years:—

In New South Wales, 1 case to 80,365·51 of the total population, or 1 case to every 43,508·27 of the male population. In Victoria, 1 case to 61,706·88 of the total, or 1 case to 29,380·58 of the male population. In Queensland, 1 case to 63,130 of the inhabitants, or 1 case to 35,779·38 of the males. In South Australia, 1 case to 144,784·88, or 1 case to 75,424 males. In Tasmania, 1 case to 34,154·75 of the whole population, or 1 case to 20,229·25 males.

In addition to the cases that I have been able to gather from the hospitals, there were, doubtless, during the past four years several operations annually performed in private; if these could be collected they would serve to show that the disease is more common than my calculations would lead one to believe.

The proportions in the colonies named are as under:—

New South Wales.—14·5 cases per annum, *i.e.*, 1 to 80,365·51 inhabitants; or 1 to 43,508·27 of the male population.

Victoria.—18·75 cases per annum, *i.e.*, 1 to 61,706·88 inhabitants; or 1 to 29,380·58 of the male population.

Queensland.—6·5 cases per annum, *i.e.*, 1 to 63,130 inhabitants; or 1 to 35,779·38 of the male population.

South Australia.—2·25 cases per annum, *i.e.*, 1 to 144,781·88 inhabitants; or 1 to 75,424 of the male population.

Tasmania.—4 cases per annum, *i.e.*, 1 to 38,154·75 inhabitants; or 1 to 20,229·25 of the male population.

N.B.—In Aberdeenshire, 1 case to 27,800 population.

I have worked out the proportion of cases to the male population as the disease is so much more common in this sex, and with little doubt the cases which have not been accounted for would amply cover those occurring in the female inhabitants. In all countries the female is much less subject to the disease, why is not apparent at present.

Formulating an opinion as to whether the disease is increasing in Australia, it appears to me that the larger average of cases for the last four years (than occurred in the preceding decade) is accounted for by the augmented population, and not by any special endemicity, though it may come to pass, as the continent becomes more thickly populated, that in definite and, perhaps, well defined areas, the inhabitants will be very subject to the affection. Even, at present, the proportion of cases in Tasmania is not far short of that in Aberdeenshire, and grouping Geelong, Ballarat, and Bendigo the ratio is greater than elsewhere.

A very important subject is that of the variety of operation performed for the relief of the stone in the bladder. It has become doubly interesting during the last ten years, as the advances made in the crushing procedure have been very great. In working this matter out I shall do so under three heads, *viz.* :—

1st.—Lithotrity, meaning by this the crushing of the stone at a single sitting, and removing the debris at the same time, *i.e.*, litholopaxy of Bigelow. 2nd.—Perineal lithotomies; and 3rd.—Suprapubic lithotomies. The answers I have received deal with 124 operations; 38 in New South Wales, 44 in Victoria, 25 in Queensland, 9 in South Australia, and 8 in Tasmania; in a tabulated form they may be seen at a glance in the following :—

	New South Wales.	Victoria.	Queens- land.	South Australia.	Tasmania.	West Australia.	Total.
Lithotrity	16	2	3	2	3	Nil.	26
Perineal lithotomies ...	10	37	15	2	1	Nil.	65
Suprapubic lithotomies....	17	29	7	5	4	Nil.	62
Totals	43	68	25	9	8	.....	153

The suprapubic and the perineal operations have been nearly equal favourites with Australian surgeons. In New South Wales alone the crushing procedures have been in excess of the perineal cutting operations.

In New South Wales, South Australia, and Tasmania, the suprapubic has been the favourite procedure; while in Victoria and Queensland the perineal route to the bladder has been the elect.

From the particulars which have appeared in the various medical journals written by Indian surgeons, the claims of the crushing methods of removing the stone have been advanced, and great deference must be given to the

opinions of these gentlemen who have such largo experience in so few years. To me the great advantages of this operation are the low death-rate, and the rapidity with which patients of all ages recover. Old people (by this meaning those over 60 years) stand the operation well, especially if none of the stone be left behind, and instead of the bogie "Cystitis," which in the days of the many sitting procedure militated against the prospects of recovery, being a danger, it is rapidly cured by the removal of the irritating stone, and its persistence is an indication that the whole of the offending material has not been got rid of. The low mortality of 3 per cent., which Sir Hy. Thompson says was "a better achievement than he had ever ventured to hope for," has been improved upon, and an elderly person with stone can now be told almost certainly that in submitting to this procedure he is running little risk, and he has every chance of a complete cure.

In regard to the second advantage, in 1888 I worked out a series of cases, giving the periods during which the patient remained in hospital after undergoing this operation, the result being that in children about 70 per cent. required less than five days' treatment, or rather rest, while only one patient out of 105 needed to remain over twenty days; while in adults nearly 70 per cent. were discharged within five days, and none required more than twenty days looking after. The prophecy of the leading English authorities, who, in the beginning of the eighties, said that in adults the cutting operations for stone would at no very distant date become a thing of the past, with few exceptions, is being more than fulfilled, and the prophecy can now be extended to youths and those of tender years.

But has not lithotomy its disadvantages? Certainly; and more especially do some of them exist in this country; they are: 1. The trouble (expense and other) in obtaining reliable and suitable instruments where the demand for them is not great, especially is this the case where those required for children are needed. 2. The difficulty of the operation in the hands of surgeons who, only at distant intervals, have the opportunity and necessity for its employment, and these only begin with the introduction of the lithotrite to the bladder. 3. The danger of the last fragment.

Perineal lithotomies, those time-honored methods of curing this disease, have been used by Australian surgeons in 45 cases. The advantages and usefulness of this route into the male bladder will ever remain for the removal of those stones, which are not too large for the incision that can be made in the prostate.

Suprapubic lithotomies, which are the means most resorted to in Australia for removing calculi, comprise nearly half the operations during the past four years. Since the danger of injuring the peritoneum has been dispelled, methods brought forward of raising the bladder upwards behind the symphysis pubis, improvements made in holding the bladder in position, making an opening in it and closing it again, and the recent developments in treating the wound, this, the simplest means of reaching the bladder and the most satisfactory for exploring its interior, has increased its usefulness, and will always maintain its position in those cases where the stone lies in a cul-de-sac of the bladder-wall, or in other ways and size is rendered inaccessible by the less fatal means. All statistics, in both children and adults, go to show that the deaths after this proceeding are much the more numerous. In the lists of cases that I have gone through the rates are in children at least 5 per cent., and in adults 18.18 per cent., these being much in excess of the mortality following the other methods.

Remarks on Syphilis.

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At the outset, I may state, to save any misapprehension, that these remarks have no claim whatever to any novelty or originality—they refer only to some points in connection with syphilis which have, more than others, impressed me with their importance during the course of practice.

The course of disease, as witnessed in practice, differs from the description of the typical case as presented in the text books in few instances more than in syphilis. This in general, is not to be wondered at, considering the different soils in which the seeds of disease are planted, and the fact that these descriptions are, for the most part, meant to apply to the natural evolution of the disease uninfluenced by treatment, whereas, in practice, this course is modified by treatment.

First, with reference to the initial lesion. Doubtless, we can all remember the elaborate distinctions between the “hard” and “soft” sores, which were so carefully enumerated by our teachers, and by means of which we supposed we would be able to give our future patients an unfavourable or favourable prognosis, respectively. It is a pleasing thing to be able to allay a patient’s fears in this matter, but it is a bitter disappointment for a man to learn, some weeks after a favourable prognosis has been given, that he is, after all, a victim to true syphilis. While finding it impossible to add anything to the admirable descriptions given in so many medical and surgical works of the appearance of the different lesions, I only urge that we should not be too ready to found a prognosis upon them. Bryant quotes the “Committee on Syphilis” as follows:—“It should never be forgotten that it is the virus which infects the system, and that the sore is the mere local lesion, and not a necessary antecedent to infection”; and again from J. Lane: “It is impossible to predicate with absolute certainty of any given sore that it will or will not be followed by constitutional infection.” Experience has convinced me of the truth of these statements. I have seen two distinct typical hard sores on the prepuce at the same time, followed by secondary symptoms, and two cases of syphilis where the risk of infection was freely admitted, but where, to the patient’s knowledge, no primary sore was noticed. It is always difficult to prove a negative, and it may be urged that there may have been a small, indurated, painless sore or papule which escaped detection. I have frequently known both single and multiple soft sores followed by constitutional symptoms. It may be urged in these cases that though I may not, at the time of examination, have been able to detect any induration, yet such may have manifested itself subsequently; granting this, it does not detract from my contention that it is unwise to give a prognosis from the character of the sore. At present, the most we can say is that a patient with a typical hard sore will almost to a certainty suffer from constitutional infection, whereas, with the soft sore, especially if multiple, he has a chance of escaping. This guarded manner of speaking may not impress the patient with the same confidence in his medical adviser as do the utterances of the cock-sure type of practitioner so admirably described by Mr. Cadge; never-

theless, experience confirms me in the wisdom of it. Without going into the question of the unity or duality of the venereal poison, the utterances of Mr. Jonathan Hutchinson seem sufficiently to account for the varying characters of the sores we meet with. He says: "The study of the first stage of syphilis has been rendered much more difficult than would otherwise have been the case, by the fact that its contagion is rarely affected by a pure fluid. In a majority of cases, not only is the particular virus of syphilis implanted, but with it the contagious products of peculiar forms of inflammatory action. In this way the local or primary symptoms are often complicated, and we witness on the same spot the results of the implantation of inflammatory material and of the true virus. Further, it may, and often does happen, that either a contagion from the inflammatory material alone takes place, or that the effects of this entirely overpower and destroy the specific virus which was mixed with it." In this connection it is interesting to recall Jenner's "Golden Rule" with regard to vaccination, never to take lymph from vesicles in which there is an areola, and in which, therefore, the normal contents of the vesicle will have become mingled with the products of common inflammation.

May not the constitution of the patient account in great part for the differences of the manifestations of syphilis in all its stages? While the origin of syphilis is not known to us, there is no doubt but that it appeared in a severe form in Europe towards the close of the fifteenth century, and that it prevailed widely; indeed, I remember the late Professor John Marshall saying in his lectures that if all of us could trace our ancestry, he believed it would be found that most people inherited, in some degree, the taint of syphilis. So long ago as 1812, Dr. Ferguson made observations regarding the extreme mildness of the disease in Portugal and some districts in Russia. This was attributed to the fact that the disease having been allowed to run its course for ages, the whole population was, to some extent, protected. So mild is its course in Portugal that it is said to be easily treated without the aid of mercury. Here we may find an explanation for the belief of those who deny the necessity of giving mercury as a routine treatment in syphilis. As regards treatment, doubtless we all have our favourite preparations, and in the earlier stages so long as mercury is given it matters little in what form it is administered. The hypodermic method is no doubt efficacious, but where other and simpler plans are available it is not likely to become popular. Personally, the Hyd. c. cret. commends itself, not but that there are other equally, if not more efficacious preparations, but because it can be administered in small doses, in convenient form, and for very long periods of time without apparently any injurious effects on the digestion. Appropriate doses of opium should be combined with it, and will be found beneficial, apart from its action in preventing purging. In the later stages we are all familiar with the marvellous action of the preparations of iodine—in fact, the action of mercury and iodine in the treatment of syphilis would alone suffice to keep alive our faith in the efficacy of drugs. In cases where these remedies alone fail, and fail they will sometimes in persons of broken health, it is necessary to attend to general therapeutic indications, to remove our patient from insanitary surroundings, and, if necessary, to the sea-side, to attend to their diet so that they get abundant and wholesome food, and while wine or stout may be allowed in limited quantity at meal time if patients are accustomed to their use, spirits should as a rule be avoided. Nothing so militates against recovery and leads to relapses as the excessive use of alcohol. When the tongue or mucous membrane of the mouth or pharynx is affected, smoking should be prohibited.

We must be on our guard lest we see syphilis in everything. Because a man has had syphilis, that is no reason why it should have a monopoly of him, and that he should be exempt from other ills that afflict humanity. Doubtless the disease influences the course of and sets its seal upon other pathological processes, but it is not to this I refer. Recently, I saw a man who was suffering from pityriasis versicolor on the trunk, and who gave an indefinite history of venereal disease. He had been under medical treatment, taking mercury and iodide of potassium for several months. In spite of the fact that in ten days the fawn-coloured patches had nearly disappeared, solely under the local application of a lotion of hyposulphite of soda, this man cannot get rid of the idea that he is the victim of syphilis, and occasionally presents himself to display some imaginary manifestation of that disease. Especially in the cutaneous eruptions of children is there liability to err; nor is the mere fact that these improve under small doses of mercury, in the form of gray powder, sufficient to clinch the diagnosis, seeing that they often depend upon some gastro-intestinal irritation which the mercury benefits.

As to the Curability of Syphilis.—Except in the cases of persons who have been unable, or have neglected, to obtain treatment on modern principles, it is most rare to see any of the late serious consequences of this disease. I am well aware that they are in reality only too common, but they will be found almost invariably to be confined to persons who, either from inability or indifference, have failed to continue for a sufficiently long time under treatment. Unfortunately, people will buy their own experience, and it is with syphilis, as with many other troubles, "out of sight, out of mind." In healthy young adults, who will submit to treatment, varying from six months to two years, I consider that syphilis is, to all intents and purposes, curable. That this is possible is sufficiently proved by the undoubted instances of persons having two distinct attacks of the disease, and further by the fact that in no case where I know that the treatment has been prolonged and thorough, and the patient has subsequently contracted marriage, has any injurious influence been manifest in either wife or children. When the most favourable view is taken, it must, nevertheless, be admitted that syphilis as it actually appears to us in practice is indeed a terrible disease, and one of which we only, as medical men, are able to see the evil and far-reaching effects. These are most manifest among the careless and indifferent, who form a large portion of the population. I look forward to the day when a more enlightened public opinion will see the necessity for a comprehensive Contagious Diseases Act. It certainly seems an anomaly in this 19th century to see, as I have done, a woman treated for syphilis in the morning and plying her trade in a place of public entertainment in the evening. We must deal with human nature as it is, and not with human nature as it ought to be. It is not by mutual abuse that those who differ as to the necessity for state control of prostitution can hope to do good. We, on our part, must make great allowance for sentiment, and endeavour to point out the baneful influence of this disease on the physique of the nation.

Case of Neuroma of the Median Nerve recurring three times after removal, with final amputation at shoulder joint.

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WILLIAM MATTHEWS, aged 26, a labourer, and a healthy-looking man, was admitted into the General Hospital, at Hobart, under my care, on January 21st, 1890, for a tumor in the middle of the left arm. He stated that a year ago he strained his arm and the swelling then gradually appeared, and that during the last three months it had grown more rapidly. The tumor is oval in shape, slightly movable, and smooth; the skin is not adherent, and there are no enlarged glands in the axilla. On pressing the tumor, pain is at once felt in the fingers, but there is not much pain without pressure. The diagnosis was a neuroma of the median nerve.

January 22nd.—The tumor was removed, and dissected out from the nerve fibres to which it was closely attached. The wound soon healed, and he left the hospital on February 19th, 1890, with no loss of sensation nor of muscular power.

In October, 1890 (eight months after), he came again with a recurrence of the tumor, and was readmitted to the hospital. The new growth was situated, for the most part, above the cicatrix of the former operation, and began to appear in four months after the wound had healed, and has increased rapidly in size. It is less movable and more painful than before, with pain and numbness in the course of the median nerve. On October 27th the tumor was removed for the second time. It was more closely attached, and the brachial artery was laid bare for at least 3 inches. Again the wound healed rapidly, and he was discharged on November 21st, with no loss of sensation nor of motor power, although he could not lift as heavy a weight as before. At this operation it was found necessary to divide the nerve above and below the tumor, and the gap was too great to allow the cut ends to be re-united by suture.

He came again to the hospital in October, 1891 (eleven months after), and was admitted. The tumor had grown again, and was as large as before, and more bound down by adhesions; it extended now close down to the elbow-joint, and quite up to the middle of the arm. On November the 17th, I removed it for the third time, and this time was obliged to cut away a large portion of the brachial artery, which was surrounded by the tumor, and could not be separated from it. The wound healed well, and he was discharged on December the 20th. There was now slight loss of sensation in the hand, and of some motor power in the fore-finger only; circulation had been well re-established.

Matthews came again, and for the fourth time, to the hospital, and was admitted on June 20th, 1892. The tumor was now larger than ever, and extended well above the middle of the arm. The skin was less movable, and the tumor more bound down and not so well defined as before. There was no glandular enlargement.

In consultation with my colleagues, it was now considered necessary to remove the limb, and I amputated it at the shoulder joint on June the 29th, by the oval method. Hæmorrhage was very free, but was controlled for me by my friend Mr. Butler. Secondary hæmorrhage occurred three times, first on July 12th, in amount about 3 or 4 fluid ounces: again on July 14th, to the amount of 6 ounces; and on the 15th, about 3 ounces. Elastic pressure, with Martin's rubber bandage and large pads, stopped the bleeding each time. I was anxious to avoid re-opening the wound, because healing had well advanced, and I thought that I might re-open arteries which were plugged in looking for the one which was patent. On July 23rd, a large clot came away with much pus, and the pus continued to ooze from the ends of the wound for several weeks. He improved in health and strength, and the wound healed, except a sinus, but he had not left the hospital when this paper was sent, on August 24th.

I wish to bring this case under notice, not so much on account of the recurrence of the growth three times, because, although interesting, that is not new, but chiefly for the reason that after excision of about 4 inches of the median nerve, sensation and motor power were not destroyed in the hand and forearm. Indeed, although the tumor with the nerve was removed at the second operation on October 27th, 1890, there was very slight impairment of the function of the nerve up to the date of amputation in June, 1892. The tumor was a sarcoma, but I regret that it was not examined by the microscope, through an oversight and by a mistake.

Paralysis of the Right Arm due to injury to Brachial Plexus during parturition—Ultimate recovery of movement.

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IN most cases in which there has been any injury to the brachial plexus during childbirth, the resulting paralysis remains much the same, the arm wastes, and the fingers become contracted into the palm of the hand. After an accident of this sort it depends, no doubt, upon the amount of injury to the nerves whether any improvement takes place or not. If the nerves are very much stretched, or even ruptured, there is no hope that any muscular power will return, but if there be simply bruising with effusion into the nerve sheath there seems every prospect that, as this effusion is absorbed, the paralysis will ultimately pass off. My case is, I take it, of this latter kind. On the 12th September, 1891, I attended Mrs. M. with her eighth child. The confinement was tedious, and I had to deliver the head with forceps. This was easily done, but, after waiting some time for the shoulders to be born, I introduced my hand and carefully brought down, first, the right arm and then the left, and the body was quickly delivered. No force was at any time used. At my next visit the nurse called my attention to the fact that the child's right arm was paralysed. On examination I could find no marks of violence, but the arm, turned very much inwards, hung immovable. Thinking it possible that there might be fracture of the clavicle or separation of the upper epiphysis of the humerus, which the child's fatness prevented me from finding, I put the arm up, and kept it immovable for three weeks. I took it down for examination once during the time, but the condition was as at first, and manipulation caused no pain. At the end of twenty-one days the arm, on being held up, dropped immediately to the side, and there was no power in any of the muscles. I then thought that the brachial plexus must have been wounded, and Dr. Stirling and Dr. Swift, who saw the case with me, agreed in this opinion. It was impossible in so young a child to test sensation accurately, but over the deltoid and over the front of the arm it appeared to be abolished. The prick of a needle could, however, be felt on the forearm and hand. We decided that the arm should be massaged every other day for four weeks. This was accordingly done, and at the end of that time the infant could move her fingers and thumb, and could grasp anything put into her hand; the forearm could likewise be raised a little. The muscles felt soft, and there was complete paralysis of the deltoid. The arm also was turned inwards, which I took to be due to paralysis of the *teres minor*. Massage was continued for another month, and at the end of that time the following condition was found: The hand can be moved on the forearm, and the latter raised to a right angle with the arm. The whole limb can be raised from the side about 5 inches, and a needle prick is felt over the deltoid and biceps. If the infant is put on her back she can, with the aid of the *pectoralis major*, *trapezius*, and *levator anguli scapulæ*, drag her arms across the chest, and get her fingers into her mouth.

From this point improvement was uninterrupted and fairly rapid. Massage was continued for two months more, and at the end of six months the infant could support her arm at right angles to her body. The muscles, especially the deltoid, however, felt softer on the right side than on the left. On the 28th of August this year the following condition was noted: The child can move her right arm in all directions and raise it above her head. Sensation has completely returned. On crawling she sometimes falls to the right side, and to hold anything she always uses the left hand in preference to her right. As improvement is still going on I have little doubt that recovery will ultimately be complete. I was aware of the fact that injuries such as the one I have described are sometimes accompanied by eye symptoms on the side affected, but I could find none in the case I have recorded.

Judging from the number of reported cases, injuries to the brachial plexus, which occur at birth and result in paralysis of the arm, must be comparatively rare. The only instance which I can find which at all resembles my own is put on record by Mr. Jonathan Hutchinson. This case is reported in the first volume of *Archives of Surgery*, page 64. The infant was delivered with forceps with much force. The clavicle was broken near its acromial end, and possibly the scapula also. The affected arm was paralysed from the first, and at the end of one year the condition, in spite of galvanism, remained the same. Twelve months later, when Mr. Hutchinson saw the child again, the arm was quite helpless and the hand dusky red and cold. The fingers were contracted and the thumb could only be moved a little. There was no movement in any of the other muscles and the deltoid was much wasted. The shoulder and elbow were stiffened and sensation was deficient over the whole limb. Galvanism seemed at this period to give rise to some pain. There were no eye symptoms.

After reading such an unfavourable case, I thought it might be of interest to put on record an instance of recovery.

A Record of Twenty Cases of Compound Fracture of the Skull.

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THE main feature in the treatment of compound fracture of the skull resolves itself broadly into the question of immediate operation (trephining and elevating) or not. The bulk of evidence at the present day is in favour of immediate operation; and the record of the following twenty cases, which have come under my treatment during the last five years, of which eighteen cases subjected to immediate operative interference recovered, and the two not so subjected died, would seem to very strongly confirm the opinion of those who, like myself, hold with the necessity for immediate operation.

The main advantages of this treatment are—first, the ensuring of a thoroughly aseptic condition of the wound; second, the minimising of the possible pathological sequelæ of brain injuries not treated by operation.

Before proceeding to a detailed account of the cases, I should like briefly to state that I have been led to adopt the method of immediate operation from the fatal issue that accompanied its neglect in cases 1 and 7.

In *Case 1*, that of a strong, healthy boy of 17 months, there was found, as the result of a kick from a horse, a fairly extensive lacerated wound over the left forehead, leading to a depressed fracture. In view of the entire absence of symptoms, and considering his youth and health, and influenced by the opinion of my colleagues, I decided not to operate, with the result that for twelve days the case proceeded uninterruptedly to an apparent recovery. On the thirteenth day he vomited his food twice. This was followed next day by a rise of temperature to 103 degrees, and a severe general convulsion ending in unconsciousness. On being sent for, I immediately cut down, reopened the wound, and removed several portions of loose bone, which were irritating the dura mater, the latter, however, being intact. Two hours afterwards severe convulsions followed, and the boy died. The *post-mortem* revealed general encephalo-meningitis, with an abscess on the brain.

This case very deeply impressed me with the absolute necessity for immediate operative interference in all cases of compound depressed fracture of the skull, and showed me the folly of waiting for the development of symptoms of inflammation before operating.

In *Case 7*, that of a boy of 14, who met with an apparently trivial depressed fracture of the upper part of the left frontal bone, there were no symptoms till the eleventh day, when his pulse began to slow to 60; on the thirteenth day it had fallen to 45, and was distinctly cerebral in character; on the twenty-fourth day he vomited three or four times in the course of twenty-four hours, and three days later he died. The *post-mortem* revealed splintering and chipping of the inner table, with slight depression of the outer table, a collection of half a drachm of localised pus between the bone and dura mater, and also the presence of an abscess, the size of a large mandarin

orange, occupying the greater portion of the left frontal lobe. In this case the apparently slight nature of the injury did not impress me with the necessity for operating; but, on reviewing the case, I must admit that there were two symptoms, viz., vomiting and a gradual slowing of the pulse, which were strongly indicative of intra-cranial pressure, such as would be caused by an abscess; and there is a fair amount of probability that, had I been on my guard and trephined at the time the pulse first began to slow, the boy's life might have been saved.

Case 14 presents several points of interest. It was that of a young man who attempted to commit suicide by shooting himself with an old horse-pistol. The wound was over the right forehead, and I endeavoured to ascertain the track of the bullet by passing in a heavy leaden probe and by moving the head about so as to enable the probe by its own weight to gravitate in the direction taken by the bullet. Had I been assured that the probe had so gravitated and reached the inner table of the skull, I had intended to use a large trephine over that spot, with a fair probability of extracting the bullet; but as the probe did not, by its own weight, pass along the course traced by the bullet, and as I feared the consequences of creating a second channel by forcing the probe, I, as I think wisely, desisted. The patient, after a somewhat dangerous and trying time, recovered; and by his subsequent symptoms, I was able to fairly well localise the position of the bullet, inasmuch as he developed well-marked paralysis of the right arm and leg. I was anxious to get his permission to trephine over the motor area of the arm and leg, as I felt pretty confident that I would without much difficulty find the bullet, and, in view of my past experience, deemed the operation to be without much risk. I anticipated that, in the future, the presence of this foreign body would probably give rise to after effects, and in this I was not mistaken. The paralysis, in the course of a few months, almost entirely disappeared, but one day he was picked up in the street in a severe fit, and brought to the hospital. I again urged upon him the propriety of an operation, which he declined. Three months later he had another fit, but has had none since. I saw him last week; he is now in perfect health, weighs heavier than he did before the accident, and the paralysis has practically disappeared, the grasp of his right hand being little less than that of his left.

Case 15.—Is of even greater interest as showing what external injuries may be sustained by certain parts of the brain with perfect recovery. This case was that of a remarkably fine-looking young man, of exceptional physique and habits, who was ramming a wad into an old-fashioned muzzle-loading pistol into which he had put the powder but not the bullet, when it accidentally went off. The ramrod entered his left cheek-bone about an inch and a-half below the lower eyelid, it passed up through the superior maxilla, through the back of the eye, and up through the upper portion of the parietal bone five inches from the frontal ridge. The patient was in the country when the accident happened, and did not reach the hospital till five hours later. Though almost collapsed and pale, yet rational, he walked into the operating theatre and presented a somewhat grotesque appearance with six inches and a-half of ramrod sticking out like a lightning conductor from the top of his head. He was able to tell me that the ramrod, which he made himself and which consisted of a steel rod with a leaden butt, was 9 in. in length, and as 8 in. of the ramrod were sticking out through his skull, he was positive that 1 in. was still in his brain. I first removed the left eye, which was collapsed. I, then, with a fine steel saw removed the pro-

jecting portion of the ramrod. I next used a fair-sized trephine and extracted the leaden butt, which had forced its way partially through the bone, and which had a diameter of a third of an inch. The ramrod was dirty and rusty. I then tried to pass a small silver probe, with an eye in it, down through the upper wound so as to bring it out through the opening on the orbital plate of the frontal bone, but as I failed in my first attempt, I did not consider it advisable to persevere; but on inserting the fine gutta-percha nozzle of an irrigator into the lower wound and turning on the tap, after a few seconds the fluid, to my intense relief, began to come out through the upper wound. I was thus able to wash out minute fragments of bone together with a considerable quantity of broken down brain substance and blood. I continued this irrigation for several minutes, until I had passed three or four quarts of a weak perchloride solution through, and felt fairly confident that the track was in an aseptic condition. Had I been able to pass a probe through, I would have drawn up a fine drainage tube, but as I mentioned before, I failed to do this. The subsequent progress of the case was most satisfactory; the wound rapidly healed, and in six weeks the patient was able to resume his ordinary duty—that of a telegraph operator. I have seen him within the past week, and he assures me that, with the exception of the loss of his eye, he was never in better health, and that both mentally and physically (to use his own words) “he is as good a man to-day as he ever was.” This case illustrates very well the great injury the anterior portion of the brain may undergo without absolutely having any after effects. I attribute the success in this case entirely to the fact that I was able to remove all the broken down brain matter, blood clots, and dirt caused by the passage of the ramrod, and to render the whole tract fairly aseptic. Had I not succeeded in getting this stream through, I feel satisfied that the patient would have died from “Encephalitis.” Another important factor was that, by the passage of the rod through the skin, superior maxilla, and eyeball, it had to a certain extent been cleaned, and so reached the brain fairly free from irritating matter.

On the other hand, in marked contrast to this case as showing the damage that can be caused by a minute particle, let me cite the case of a boy who was quite recently brought into one of my beds for a gun-shot injury of the face. He presented all the symptoms of general meningitis (the injury having occurred a fortnight before), which gave no clue to any local injury. After a few days he died, and it was found that a No. 4 shot had perforated the skull on the right side close to the spheno-squamous suture, passed through the dura mater, the apex of the right temporo-sphenoidal lobe, obliquely across the pons varolii, through the left lobe of the cerebellum, and lodged just beneath the left half of the tentorium cerebelli. A large abscess had formed between the dura mater and the brain, starting at the point of entrance of the shot, and extending up to the vertex. The wound of entrance on the skin of the face was quite healed, and hardly perceptible.

In not a single instance have I had a case of hernia cerebri, and this is to be attributed to the perfect antisepticism which I have always carried out. In all cases, the first thing that was done was to shave the head and scrub it with a nail brush, then to wash it with either ether or alcohol, and finally with a strong carbolic acid solution of 1 in 40. When it was impossible to thoroughly expose the fracture through the original wound, I have preferred to make a U-shaped incision, with its convexity away from the vessels. Where practicable, I have always elevated the bone without the use of the trephine, but my experience has taught me that in the vast majority

of cases the method is not feasible. When it has been possible to elevate the depressed bone without detaching it from the surrounding bone, I have done so. I have never yet replaced the loose fragments, because I have been satisfied to leave well alone, and not to run the risk of their non-union with the surrounding bone and subsequent presence as irritants. In this I may be wrong, and I am not in accordance with the more modern practice as employed by Victor Horsley and others. I have always made a special point of introducing my finger under the edge of the sound bone, all the way round the opening, so as to satisfy myself that I have left no splinters or spicules of the inner table of the skull to irritate the dura mater. I have had practically very little trouble with regard to hæmorrhage. In one instance, in removing a portion of the frontal bone it opened into the longitudinal sinus, and gave rise to severe hæmorrhage, but I found that a dry aseptic sponge tightly held over it for two or three hours was sufficient to stop it. Where there has been general hæmorrhage from the vessels of the pia mater, the same treatment has been adopted, and the wound stitched up when the bleeding has ceased.

It has been my practice in nearly every case to put in a small drainage-tube, having previously thoroughly cleansed and irrigated the wound with perchloride solution, and freely dusted on powdered iodoform. Where the dura mater has been torn, if the surface of the brain has been much injured, or where there has been absolute loss of brain substance, I have made a point of passing the drainage-tube through the opening on to the injured brain, and in many instances a fair quantity of softened brain has thereby come out; but where the dura mater has been torn, and where there did not appear to me to be much damage done to the brain, I have invariably sewn up the wound with fine cat-gut sutures. In those cases where the hæmorrhage from the vessels in the dura mater has been profuse, I have passed a very fine needle, threaded with cat-gut, through the dura mater on the proximal side of the vessels, thereby securing them.

On reviewing these cases, together with those about to be recorded, I think I have proved that the operation of trephining, as evidenced by the eighteen successful instances, is one which I may say is absolutely without risk. In most cases it is a very simple operation, and one that can be easily accomplished by any surgeon having a due regard to cleanliness and antisepticism. The lesson the recital of examples teaches is, I maintain, that all cases of compound depressed fractures should, if possible, be immediately treated by operation. Had I gained the experience when I had cases No. 1 and No. 7 that I have had since, I make bold to say that, instead of having eighteen successful cases, I would have had twenty, and would have thereby saved two lives whose loss I feel I am morally responsible for. I do not for one moment wish to contend that, had my successful cases been treated without operation, they would all have died, but I feel convinced that several of them would have ended fatally; and that even some of those that might have recovered would probably have done so, suffering from the after effects, which we see not uncommonly associated with cases of depressed fracture, which have not been the subject of operative interference; I allude to Jacksonian epilepsy, insanity, and cerebral irritability. As not one of the subjects of this treatment suffers from any after effects, it is very doubtful if that would have been the case in the absence of operation. My experience in these cases of fracture coincides with that of all other writers on the subject, namely, that the depressed bone never gives rise to any symptoms of compression, and that, when those symptoms do exist, they are either the result of hæmorrhage or actual injury to the brain itself, as related in case No. 20.

I have endeavoured to make this paper as short as possible, and in conclusion I may be allowed to offer this comment—that I attribute the good results here recorded to the beneficent effects of antiseptic surgery, which we owe to one to whom, more than any other man, modern surgery is indebted for its greatest triumphs, viz., my old teacher, Sir Joseph Lister.

Case 1.—W. C., aged 17½ months; admitted into Melbourne Hospital on August 30th, 1887; patient's mother states that he was found lying in a drain in a ploughed field; there were two heavy draught horses in the paddock, and she presumes that he must have been kicked by one of them; on admission, there is a large lacerated stellate wound over the left eye, which leads down to bare bone, and at the lower part a depressed fracture can be detected; there is also a large hematoma over the lower part of the left side of the head; there were no brain symptoms. A consultation was held, and it was decided not to operate; wound was thoroughly cleansed with perchloride lotion, a drainage-tube inserted, and wound dressed with perchloride gauze; he progressed favourably until 12th of September, when he vomited his food twice; on the 13th his temperature went up to 102°, and at 6 o'clock p.m. he had a severe fit, affecting the whole of the body, and the muscles of the back became rigid; two hours after he had another fit, and became unconscious; Mr. Ryan was sent for, and cut down, trephined, removed the depressed bone; the dura mater was found to be uninjured; patient had another fit, and died; *post-mortem* examination revealed the presence of a large abscess in the left frontal lobe, with the presence of pus in the arachnoid space, especially towards the base of the brain.

Case 2.—R. P., aged 7 years; admitted into Melbourne Hospital on 7th April, 1889; patient was crossing a street, when she was run over by a tram car; on admission, there is a large lacerated and contused wound over the left side of the face and head; the eye was uninjured; the external angular process of the frontal bone was detached to the size of a florin, and was found sticking through the dura mater, and injuring the superficial surface of the brain; Mr. Ryan was sent for, and he removed the loose fragment, together with two smaller pieces; the parts were thoroughly cleansed and irrigated with weak perchloride lotion; dusted with iodoform, and several horse-hair sutures were put in, so as to cover the parts. Tuesday after temperature went up to 102°, and patient had some vomiting; portion of the flap sloughed, exposing a large area of bare bone, which in the course of time became covered with granulations; and on the 9th of May facial paralysis was for the first time observed; she progressed favourably, and was sent home on May 24th; the wound subsequently healed.

Case 3.—J. B., aged 6 years; admitted into Melbourne Hospital on 2nd June, 1889; patient was sliding down the rail of a staircase, when he fell a distance of two stories on the stone flags below; on admission patient was unconscious, he vomited blood, and was found to be bleeding freely from his right ear, also from the nose. On examination, there is a compound comminuted depressed fracture of the whole of the right side of the head; Mr. Ryan extensively opened up the wound, which was triangular in shape, the bone was extensively comminuted, and brain matter was exuding from between the fragments; one large-sized one was found pressing into the brain at right angles, this, together with two or three smaller ones, was removed, as also some brain matter; the wound was cleansed and irrigated, and the whole sewn together after a small drainage-tube had been inserted; patient was very restless for three or four days, and had a fairly free escape

of cerebro-spinal fluid from his ear; on the 14th, a fluctuating swelling just above the right ear was noticed, and his temperature rose to 102° ; on the next day this swelling disappeared, and coincidentally a free discharge took place through the ear; from this time he progressed favourably, and left the hospital well on the 4th of October.

Case 4.—E.B., aged 27 years, married; admitted on 2nd November, 1892; patient was struck on the back of the head with a piece of road metal. On examination there is a small wound on the left side of the occipital region, and a depressed fracture can be felt; Mr. Ryan made an elliptical incision and threw back the flap, exposing a gutter fracture about $1\frac{1}{2}$ inches in length; a small trephine was used, the inner table was splintered; three or four small pieces were removed, the larger fragments were elevated and left; patient left the hospital on the 20th with the wound healed.

Case 5.—C.J., aged 36 years; admitted into Melbourne Hospital on 8th May, 1890; was unloading rails from a ship; while they were being hoisted the rope broke and one of the rails struck him on the head; he was knocked down and rendered unconscious for about half an hour. On admission; he is sensible, but complains of pain in the head; has no paralysis; there is a compound comminuted depressed fracture over the top of the left parietal bone, near its junction with its fellow; this extends forwards and outwards for about 2 inches; the bone was extensively comminuted and depressed; Mr. Ryan cut down and trephined; there was a fair sized clot of blood extending outwards and downwards between the skull and dura mater; this was scooped out with a teaspoon and then well irrigated; this clot was about $\frac{3}{4}$ of an inch in thickness; the comminuted and loosened bone was removed; it had torn the dura mater, and contused and slightly injured the superficial portion of the brain; as there was considerable oozing from the small vessels in the dura mater, after the wound had been thoroughly cleansed, an antiseptic sponge was bandaged tightly over the wound, and three hours later was removed, when the hæmorrhage was found to have ceased; a drainage-tube was then inserted, the rent in the dura mater being first sewn up; at the close of the operation it was noticed that the left pupil was dilated, but sensible to light; patient was restless and irritable for a few days; he never had any paralysis, and at the end of three weeks was able to leave the hospital with the wound healed, and feeling none the worse for his accident.

Case 6.—J.C.; admitted into the Melbourne Hospital on 2nd October, 1889; he states that he was engaged in blasting in a stone quarry when a good-sized piece of bone struck him over the right frontal bone; he was rendered unconscious for some little time. On admission, there is a large lacerated wound about two inches in length right across the right forehead; there was a large portion of bone lying at right angles to the brain, and having torn a small opening by its jagged margin through the dura mater; Mr. Ryan trephined and removed this piece of bone, together with several smaller splinters; two other outlying portions of bone which were depressed were elevated; the wound dressed, and a small drainage-tube was introduced; the patient did well, and left the hospital in three weeks with the wounds healed and feeling well.

Case 7.—J.C., aged 14 years; admitted into Melbourne Hospital on 9th February, 1889; patient states that he was working in a building at 8 o'clock this morning, when a brick fell a distance of about twenty feet, and struck him on the left side of his head. On admission, there is a lacerated wound

just where the forehead and hair meet, exposing a small depressed fracture, almost more fissured than depressed, of apparently so trivial a character that Mr. Ryan decided not to operate; the wound was cleaned and dressed. February 14th.—Temperature, normal; pulse, 80°; wound looking healthy. February 20th.—Wound almost healed; temperature, normal; pulse, 60°. February 23rd.—Sleeping well; no pain in the head; temperature, 98°; pulse, 45°. February 26th.—Very low, and somewhat dull; vomited twice during the day; pulse, 46°. February 27th.—Died. *Post-mortem* revealed, splintering the inner table of the skull, a small localised collection of pus between the dura mater and skull, and a large abscess occupying the left frontal lobe. There was no laceration in the dura mater.

Case 8.—J.B., aged 43 years; admitted 21st June, 1887; patient is stated to have been hit on the left side of his head with a bit of wood; on examination, there is a lacerated wound an inch and a half in length, and, on passing in the finger, the bone was found to be fractured and depressed; Mr. Ryan operated, and elevated the depressed bone, removing several small splinters; patient discharged 12th July.

Case 9.—J.B., aged 32 years, was admitted into Melbourne Hospital on 12th June, 1889; patient's head was crushed between the ram and feeding gear of a disintegrator; on examination there is a wound about three and a half inches long, right across the forehead, with a depressed fracture of the frontal bone; there was extensive comminution, but no injury to the dura mater; all the loosened bone was removed by Mr. Ryan, and the wound sewn up; patient was discharged one month later, with the wound almost healed.

Case 10.—R.O. (constable), aged 32 years; admitted into Melbourne Hospital on 25th August, 1889; patient was assaulted and knocked down by some men with a handkerchief in which was placed a large stone; he had several lacerated wounds on his head, but one on the outer and upper part of his forehead led down to a gutter fracture; this was trephined, and the depressed and loosened bone removed; there was no injury to the dura mater; patient discharged five weeks later.

Case 11.—F.S., aged 15 years; admitted on 19th of May, 1889; was hit on the head with a stone and rendered immediately unconscious; was taken home; he remained in this condition about four hours, during which time he had three fits, each lasting four or five minutes; was admitted into the Children's Hospital next morning; on admission there is a contused and lacerated wound leading down to a depressed fracture on the back of the right parietal bone; a small piece of projecting bone was sawn off with a Heys saw, and several pieces of depressed and loosened bone were removed: the dura mater was torn, the opening was sewn up with fine gut, and the wound dressed in the usual way; he recovered without a bad symptom, and left the hospital perfectly well in five weeks.

Case 12.—N.P., aged 40 years; was seen to jump from a window on to the asphalt path below, about 12 ft.; was picked up and brought to the Hospital on 23rd of January, 1889; he had a lacerated wound over the right frontal bone about an inch in length; on examination by the finger showed it to be fractured and depressed; under the influence of chloroform, Mr. Ryan opened up the wound; it was found impossible to remove the depressed bone without the use of the trephine, and even then a narrow piece of bone had to be sawn off before the loose bone could be removed; there was an

extensive laceration of the dura mater, with hæmorrhage and breaking down of the brain substance; the usual treatment was adopted in this case, and patient was discharged well on the 21st March.

Case 13.—O.Z., admitted into Melbourne Hospital on 22nd April, 1889; was working at the Bijou fire, when he fell off a wall and was brought into the hospital in an unconscious condition; shortly after admission he had a fit, which lasted three minutes; on admission he had a lacerated wound on the top of his head leading to a depressed fracture of the frontal bone; a trephine was used and the depressed bone elevated; in doing so an opening was made into the longitudinal sinus and the bleeding was severe; a dry antiseptic sponge was placed over the wound, and a tight bandage was put on, and the sponge removed eight hours afterwards, when the bleeding was found to have entirely ceased; the wound was washed and stitched up, a small drainage-tube being inserted; he left the hospital seven weeks after, with the wound healed.

Case 14.—T.M., aged 22 years; admitted 13th September, 1890; was picked up in a paddock with a bullet wound in his left forehead; was almost unconscious on admission; on examination there is a fair-sized wound on the right side of the middle of his forehead, with blackened and ragged edges; blood and brain matter is freely coming out; Mr. Ryan opened up the wound, washed it out, and endeavoured to ascertain the course taken by the bullet; after the operation he was found to be partially paralysed on his right side; this gradually wore off, and, after a varying time, he was discharged on 2nd December.

Case 15.—R.C., aged 23 years; admitted on 8th October, 1891; patient was out shooting, and, while in the act of loading a pistol, the powder exploded and drove the ramrod through his cheek, eye, and up through the left frontal lobe of the brain; the ramrod was protruding eight inches through the skull, about an inch being within the skull; this was cut off with a saw, and the remaining portion removed with a trephine; a stream of perchloride solution was passed up through the orbit and out through the upper wound; for several days he was very ill, unconscious, and passing his water in bed; he gradually commenced to improve, and left the hospital with the wound perfectly healed on 9th November.

Case 16.—J. K., aged 10 years; admitted 9th of September, 1889; he states that he was struck on the forehead by a swinging boat; on examination, there is a wound $1\frac{1}{2}$ inches in length over the right frontal bone leading to a depressed fracture; Mr. Ryan laid back the skin and periosteum by a U-shaped flap; trephined and removed the depressed portions of bone; the dura mater was torn, and brain matter was exuding from between the fragments; patient absconded on the 27th, but three weeks later was brought up to the hospital by his father; the wound had then almost healed.

Case 17.—E. P., aged 30 years; admitted on 15th May, 1891; was knocked down by a tram car, and received a compound fracture of the left parietal bone; Mr. Ryan, under chloroform, trephined and picked out the comminuted bone; the dura mater was uninjured; patient was discharged, at his own request, four days later; three weeks after he presented himself at the hospital with the wound healed.

Case 18.—H. Y., aged 28 years; admitted on 28th February, 1890; he is said to have been struck on the head with a tomahawk; he has a compound

depressed fracture of the posterior part of his left skull ; Mr. Ryan trephined and elevated the depressed bone, removing two small splinters ; he was discharged four weeks later.

Case 19.—W. K., aged 54 years ; on 13th of June, 1891, was assaulted and struck just above his right ear with a spado ; on examining him I found a triangular-shaped wound $3\frac{1}{2}$ inches in length, involving the superior margin of the squamous portion of the right temporal bone close to its junction with the parietal ; the wound was enlarged, and a gutter fracture was discovered ; a trephine was used, and the depressed bone elevated, several small splinters being removed ; the opening in the dura mater was left alone, as the brain surface appeared contused and slightly broken ; he recovered perfectly in the course of six or seven weeks.

Case 20.—W. B., aged 47 years ; admitted 17th of July, 1892 ; was struck on the left side of the top of his head with a broom ; on admission, he was unconscious ; there was a scalp wound 3 inches long a little to the left, and somewhat behind the mid point of the vertex of the skull ; this latter was depressed and saucer-shaped, and the depression measured 2 inches by $1\frac{1}{2}$ inches ; the scalp was thrown back, and the whole of the depressed bone was elevated and removed ; it was extensively comminuted ; there was a large opening through the dura mater, and the brain was considerably damaged ; a portion of it was washed away with the irrigator ; a drainage-tube was inserted, and perchloride dressing used ; next day patient was found to be absolutely paralysed on his right side ; he left the hospital on 22nd of August, able to walk, though still weak on his right side ; on September 12th he presented himself practically well.

Two Cases of Cerebral Tumour. Localising Symptoms. Operation.

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MRS. D., 26.—Family history good; when 12 years of age had a "touch" of rheumatic fever, the pain being confined to left leg; from 18 to 21 suffered from disease of the spine in the dorsal region, and was treated by being placed in plaster jackets, and made a good recovery; during September, 1891, she had an attack of influenza, after which the symptoms of spinal trouble reappeared, necessitating a return to the treatment by plaster jackets; early in November she began to suffer from severe headache and tenderness of the scalp, more especially on the right side, and a few days later her left leg began to "jump" involuntarily, and then her left arm became affected in the same way; loss of power, more marked at first in the leg, gradually came on in leg and arm till about the middle of December; the leg was rigidly extended, with toes pointed, and the arm was fixed to the side; the fore-arm strongly flexed on the arm and the fingers clenched; both limbs were hyperæsthetic, and the least attempt at passive movement caused a pain to shoot up from the part attempted to be moved to the right side of the head; the only movement of these limbs that she could perform voluntarily were slight rotation outwards of the leg and raising of the elbow from the bed a quarter of an inch, the effort in each case causing great pain. At this time for three days she was troubled with sickness, bringing up her food undigested, and for twenty-four hours she could not raise her right eyelid as well as she could her left; January 7th, 1892, admitted to the Wairau Hospital, the left limbs being in the condition described above; sensation and power on both sides of face are equal, and are also normal in right leg and arm; the knee-jerk is exaggerated, and slight ankle clonus can be elicited on the right side; on the left side any attempt at testing the reflexes is impossible on account of the hyperæsthesia; spasmodic jerkings, especially at night, occur in the left limbs, and to a less degree on the right side; each jerking causes severe pain in right side of head and at the seat of the spinal trouble; Dr. Wallace Mackenzie, oculist, of Wellington, kindly examined her as to vision and hearing, and reports that both are normal, except that there is slight blurring of lower border of right optic disc; the condition of the heart, lungs, and abdominal organs is normal; the diagnosis arrived at is lesion in right motor area, probably single, though in face of the evanescent right eye ptosis, and the slight right ankle clonus, possibly multiple, from the nature of the spasms probably subcortical, and, considering her spinal trouble, probably of a tubercular nature.

To save recapitulation, it may be mentioned here that in the three operations in this case, and in the operation in the second case, I was assisted by Dr. Wallace Mackenzie, to whom I am indebted for many valuable suggestions in the operative details, and that chloroform was administered perfectly by Dr. Nairn, and that in the third operation in the first case I also had the advantage of the assistance of Dr. E. H. Alexander.

For some days before operation the patients were kept in bed on milk diet and the bowels well cleared. Three days before the head was shaved, and well washed and scrubbed daily afterwards with soft soap and hot water. The night before operation the head was again shaved and scrubbed and washed and covered with a piece of lint soaked in $\frac{1}{1000}$ th perchloride under a piece of oil silk. An hour before each operation this patient was given $\frac{1}{4}$ grain of morphia subcutaneously. In the case of the boy this was omitted. An india-rubber band was drawn tightly round the skull to arrest hæmorrhage. The fissure of Rolando was marked out on the scalp by Reid's lines, and the bone marked by drill through scalp at upper point of fissure of Rolando, and at a point two inches lower down the fissure, before the scalp was raised. The flap raised was large and horse-shoe shaped, its base towards the ear. Hæmorrhage from the flap was arrested by pressure forceps and ligatures. The trephine used was a $\frac{3}{4}$ -inch one of American pattern, removing a disc almost as large as the 1-inch one of English pattern would, except in the third operation in this case, when a $1\frac{1}{4}$ -inch one of American pattern was used. The larger trephine saves much time, and I think a 2-inch trephine would be useful in most cases. A circular saw worked by a dental engine would be better still, as the bone could be more rapidly cut through. The discs of bone removed were placed in a cup of warm $\frac{1}{100}$ th carbolic solution, surrounded by warm water, which was carefully kept at body heat till the pieces were required. In the first operation in the first case one disc of bone was not replaced, in order to leave an exit for drainage, but in the other operations the discs and fragments were replaced and no drainage was attempted. In each case after the cortex was incised, and some of the softened brain tissue removed, pulsation became marked, and could be noticed for some days after the operation. The dressing after the first operation in the first case was cyanide gauze, which answered very satisfactorily, but which now and then produced some irritation during the long time it had to be applied. After the other operations the scalp was well dusted with boracic acid, sterilised by heat, and over this a large dressing of Hartmann's wood wool, impregnated with perchloride, was applied. This dressing was changed the morning after the operation, a probe being passed between the lips of the wound to let out the serum which had accumulated. The stitches uniting the edges of the incision in scalp were removed, and on the fifth or sixth day the edges of the wound were firmly united, and no further dressing was required except a little cotton wool under a cap to keep the head comfortably warm.

January 11, 1892.—First operation—A disc of bone was removed just behind a point $1\frac{1}{2}$ inches down fissure of Rolando, and two discs, one above and one below this one, and somewhat overlapping it, and in the same line with regard to the fissure, and a fourth disc, immediately in front of and between the upper and first disc, were also removed. The dura, not pulsating, bulged into this opening, and was incised in a line down posterior row of discs, and in a line at right angles to this through centre of anterior disc. The cortex, not pulsating, bulged through this opening. A hypodermic needle was pushed through cortex at the point of junction of incisions in dura, and removed a little softened white brain tissue. The cortex was incised, and the opening enlarged by sinus forceps, and the finger passed through it into a cavity filled with softened brain tissue, extending 2 inches towards centre of brain, nearly to falx, and for 2 inches from there towards right border where it was not more than 1 inch in depth. A quantity of brain tissue, sufficient to fill a dessert spoon, was removed from this cavity by scraping with the finger, and small pieces of sponge held in forceps, and

washing with warm water. Two vessels were ligatured with fine catgut. The edges of the dura were brought together with catgut, a small opening being left under the centre of the disc first removed, which was not replaced, for a small India-rubber drainage tube which was brought through scalp through an opening made directly over it. The other three discs of bone were replaced, and the edges of the incision in the scalp united with silk sutures; a drainage-tube was inserted at either angle of the scalp wound, and a copious cyanide gauze dressing kept in place by a flannel bandage applied over the scalp. January 12th: Dressing changed. Tubes at angle of scalp wound removed. The drainage-tube in brain found blocked by softened brain tissue, cleansed and replaced. Has lost all pain in head, and the hyperæsthesia in left limbs. The left arm on waking was found lying extended by the side with the hand open. Can flex forearm slightly. Can raise left leg off bed, and flex it on thigh; the toes are still pointed: ankle-clonus marked on left side, but has disappeared on right side. January 19th: The drainage-tube in brain, which had been shortened daily, has been removed. February 1st: The dressings were changed daily, with strict antiseptic precautions. The scalp wound healed by first intention. There is a small hernia cerebri about a quarter of an inch above level of scalp, and a much larger one between scalp and dura. If the dressings press on this hernia loss of power occurs in the left limbs, more especially in the fingers, but disappears as soon as the pressure of the dressings is removed. She is steadily gaining power in both leg and arm. February 9th: Can touch top of head with left hand, and continues to gain power steadily, especially in the movements of toes and fingers. There is complete anæsthesia of left leg and arm, which may have existed for some days. March 1st: Loss of regained power is becoming marked, hernia continuing in same condition as to size, is now cicatrising over. From the time of the operation, a probe can be passed $2\frac{1}{4}$ inches from scalp towards centre of brain, through a small opening at the point where the drainage-tube was inserted at the posterior border of the hernia. March 4th: Epileptiform seizure occurred, lasting five minutes, during which face became congested, pupils dilated, legs and arms jumped, and she lost consciousness. Came to crying. Left hand lay extended on chest throughout, though rest of the limb jerked. March 5th: Left limbs becoming rigid, leg extended, toes pointed, arm to side, fore-arm flexed, and hand clenched. March 26th: Hernia cicatrized over, except small opening posteriorly through which probe passes. Is in the same condition as before operation, except that muscles of left side of face now twitch, and hyperæsthesia is replaced by anæsthesia.

March 27th.—Second operation ($2\frac{1}{2}$ months after first).—Scalp incised in line of former incision and raised; was very vascular over replaced discs, which were firmly united. Processes of fibrous tissue penetrated into trephine pinhole, and into interstices between surfaces of discs. The discs were firmly united to one another and to the skull. The scalp was dissected from the hernia, which was found to completely fill the opening left by the removed disc, and was surrounded at its base by a little free fringe of dura-mater. The anterior surface of the hernia was very vascular, and covered by membrane continuous with pia-mater, the posterior surface was white and apparently continuous with the white substance of the brain, and a probe passed for two inches along this surface towards the centre of the brain. The hernia was transfixed and ligatured by catgut and removed. The finger passed into the same cavity in the brain, which was again scraped and washed out. A piece of pericranium, the size of the opening in the dura, was removed from the skull from the side of the incision opposite the

raised flap, turned upside down, so as to have its bone nourishing surface upwards, and accurately united to the edges of the dura-mater. The edges of the buttonhole in the scalp, through which the hernia had protruded, were excised, and a flap of scalp moved up by method of glissement to fill the gap. The edges of incision in scalp were brought together and sutured. No drainage was employed. March 28th.—All pain had disappeared. Sensation fairly good in left leg and arm. Hand can be raised to head. Left leg can be moved freely. April 19th.—Removed to her house on a stretcher. Has continued to improve. There has been no appearance of return of power in thumb and fingers. She is still confined to bed, and is wearing a plaster jacket on account of spinal trouble. May 3rd.—Was awakened last night by a very severe pain in head. This morning her head is aching severely, and her left leg and arm are anæsthetic. July 18th.—Has gradually lost power, and now both arm and leg are rigid. The muscles of the neck on the left side are also rigid, and the face is anæsthetic as high as the parts supplied by the third division of the fifth nerve. The headache and tenderness in scalp are worse than they have ever been, and are only relieved by large doses of morphia subcutaneously.

August 4th.—Third operation (four months and a week after second).—The rigidity continued in neck, arm, and leg whilst under chloroform. A flap was raised with its base more anterior than in the other operations, and carefully dissected from flap of transplanted pericranium, the opening left by removed disc being completely filled by fibrous tissue. A disc of bone was removed with the larger trephine above and behind the highest disc removed at first operation, one-third of it being to the left of the median line, though its extreme edge was half an inch to the right of the sagittal suture, which was quite 1 in. to the left of the median line. The dura was tense, and did not pulsate. A spot beneath the centre of this disc was raised by Adam's eyehook, and incised with the point of a scalpel. Venous blood flowed freely, and a probe passed through the opening was found to be in the longitudinal sinus, and later on, after the dura was opened lower down, this point was found to lie immediately over the falx. A sponge was kept pressed over this point whilst another disc immediately to the right of this was removed, when all bleeding from this point was found to have ceased, and caused no further trouble. When the dura was opened, the cortex which was oedematous bulged through, and the brain was punctured by a hypodermic needle in the same way and with the same result as at the first operation. The opening was enlarged and explored by the finger, which passed into the same cavity filled with softened brain tissue as at previous operations. This was treated in the same way: the dura sewn up, the discs of bone replaced, and the edges of the scalp incision brought together, no drainage being employed. The same evening the pain in head, anæsthesia, and a great part of the rigidity of the limbs was found to have disappeared, and she could move her arm and leg a little. August 5th.—Can move arm at all joints but wrist, and can raise leg and bend knee. 14th.—Removed home. Feels better than after either of the previous operations. Sept. 15th.—She had an epileptiform fit, the premonitory symptom of which was a flash of light, on the 7th, and had another on the 13th, and has attacks of headache, and tenderness over the scalp on the right side. She has regained considerable power in the left leg and arm, though some rigidity persists, preventing free flexion of leg and extension of arm. She can only move her thumb a little in extension and flexion, and cannot move her fingers at all. Her spinal trouble shows marked improvement. She can now sit up for an hour at a time without pain.

R. T., 9.—A fine well-developed boy; was sent to me for surgical treatment by Dr. Pollen, of Wellington, with a diagnosis of a cortical lesion in the right motor area, probably a hydatid cyst, causing Jacksonian epilepsy. May 1st., 1892.—Dr. Pollen had had the boy under observation for 10 months, and I am indebted to him for the following information:—The family history is good, except that the father died of diabetes at 40. The boy's previous health has been good; for two years he has been liable to fits which are always preceded by shaking of the left hand and pain in the elbow, then the palm of the hand is turned outwards and the thumb and fingers become rigid, semiflexed and widely separated from one another. This stage generally lasts five minutes, and during it he cries out as if in pain. Sometimes the fit is arrested in this stage by vigorous rubbing of the elbow and fore-arm, but if not, the convulsion becomes general, the left side being always more convulsed than the right. This stage generally lasts about a minute, and unless the fit is of unusual severity he retains consciousness throughout. When first seen the fits were only occasional, and disappeared for seven weeks during the administration of bromide and iodide. During the last three months, even though these remedies have been pushed, the fits have become more frequent, he having had as many as twenty in one day. His general health is good; his left-hand grip is weak, as is also the power of flexing left fore-arm on arm. In walking he drags the left leg, and is unsteady on it; the left knee jerk is increased; there is no ankle-clonus; sensation is normal and equal on both sides; the right limb measurements are slightly greater than the left; the head is peculiarly shaped; the anterior fontanelle is wide and deeply depressed, and there is a marked prominence over right motor area. The temperature frequently rises to 99° at night; his heart, lungs and abdominal organs are normal. Dr. Wallace Mackenzie reports that his hearing is normal, and that as to his eyes the media are clear; both discs are hyperæmic, and the right disc has its margin blurred. May 10th.—Four discs of bone were removed by smaller trephine, together with the star-shaped piece lying between the four circles. Two were immediately behind the fissure of Rolando, and two immediately in front, and extended downwards from a point $1\frac{1}{2}$ inch from the median line. The dura did not pulsate till the third disc was removed, when it began to pulsate very slightly. There was a yellow patch at centre of anterior inferior disc. The dura-mater was incised diagonally across opening from behind, forwards, and at right angles from the centre of this line upwards and backwards. Cortex pulsed slightly, felt soft and pitted on pressure over lower part of surface exposed, but was normal above. The cortex could be explored by finger passed under bone to the extent of one inch in each direction, and was found normal in all directions except downwards, where it was soft. Whilst the cortex was being examined in this manner, the pia was noticed to give way over the lower part of the exposed cortex. Through this the finger passed into a cavity filled with softened brain tissue, which appeared to the naked eye exactly like the tissue removed in the previous case: this was cleared out in a similar manner. The dura was sewn up with catgut, the pieces of bone were replaced, and the edges of the scalp incision were sutured. No drainage was employed. May 11th.—Hand and fore-arm much weaker than before operation. September 15th.—The boy who had been up from the sixth day left for home at the end of six weeks, and is now able to play about just as usual. There is still a little weakness on the left side, but not to nearly so marked an extent as before the operation. There has been no return of the fits. Dr. Wallace Mackenzie examined the eyes on August 25th, and reports that both discs are still somewhat

hyperæmic; there is slight blurring of upper margin of right optic disc, and the margin of left disc is well defined. No atrophic changes; vision and field of vision normal; the hyperæmia and blurring is not so marked as it was before the operation.

Dr. Roberts, lecturer on pathology, Dunedin University, kindly examined the tissues removed in each of these cases, in both of which the naked eye appearances were very similar. In the first case, that of Mrs. D., he reports "granular matrix, with round and variously shaped cells, probably sarcoma," and in the second, that of R. J., he reports "fibrin invaded by leucocytes, which he considers may be the remains of old blood clot." The clinical history confirms the opinion he has formed.

REMARKS.

The chief points of interest in these two cases are the similarity of the naked-eye appearance of the lesion in each case, and the great pathological difference existing between them, as evidenced by the microscopical examination and the progress of the symptoms. In each case the lesion was accurately located, but the diagnosis as to the probable nature was in error. In the first case, considering the spinal disease, a tubercular lesion seemed probable; and, in the second, in the absence of any history of traumatism, the symptoms suggested hydatid.

In the first case, the following facts are of interest:—

1. That after each operation there was immediate relief from pain and recovery of sensory function, and rapid return of motor function even though apparently organic rigidity had set in. As far as the localisation of the sensory centre is concerned this case weighs rather against the theory that the motor and sensory areas are identical, as before the first operation the lesion had evidently, either by pressure or destruction of conducting fibres, destroyed the motor function of the left side, whilst the sensory centres were stimulated, as evidenced by the hyperæsthesia. Later on the sensory function was lost in the same way as the motor, but disappeared before it. These facts would be compatible with the localisation of the sensory centre, either as Ferrier holds in the hippocampal region and callosal gyrus, or as others hold in the region posterior to the motor area. It is also interesting to note that the piece of cortex contained in the hernia which was removed, was evidently part of the centre for movements of thumb and fingers, and shows the accuracy with which Reid's method mapped out the fissure of Rolando.
2. The ease with which the hæmorrhage from a slight wound of the longitudinal sinus was arrested. In another case, where a small opening in the sinus was torn whilst I was elevating a piece of depressed bone, it was arrested by similar means. In the *Medical Record*, April 9th, 1887, Weir refers to having wounded the lateral sinus without harm, and also to the fact of having successfully ligatured the longitudinal sinus.
3. The convenient method of repairing a gap in the dura-mater by transplanted perieranium. This method was, I believe, first suggested by Keen, of Philadelphia.

4. The long period during which an open wound even on the scalp can be kept aseptic, as evidenced by the primary union obtained after the second operation, and the fact of the pia and dura not having become adherent to one another.
5. The little ill-effect produced by the repeated removals of the recurring growth. Erb, in the *Wien Med. Presse*, No. 24, 1892, reports a very similar case, where at an interval of a year he twice removed a recurring gliosarcoma producing chronic spasms followed by paralysis.
6. The first case shows the difficulty and danger attending attempted drainage, and both cases go towards proving the absence of necessity for drainage in aseptic cerebral cases.
7. The ease and certainty with which the replaced discs re-unite with each other and the skull.

On a Successful Case of Nerve Grafting.

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THE records of individual cases are not so well adapted for Congress purposes as the aggregate results of certain lines of treatment, but when only a few cases of certain procedures are on record, it is, I think, allowable to bring forward an individual instance. It is strange that more has not been done in the matter of filling the interval between the divided ends of nerves by grafting nerve tissue from animals. One reason is, that while section of nerves is a common accident, the suturing and subsequent union with restoration of function is common also; but there must be a number of cases in which such separation has occurred between the ends as makes coaptation impossible. In what way shall the interval be bridged? Is it necessary to use nerve tissue as the connecting medium, or will any other tissue act as a temporary union, to be replaced by new growth from the proximal end of the severed nerve? The most obvious way to fill the gap is by splicing a bit of live nerve of about the same calibre from some animal in between the ends. From what we know of the long continuity of nerve fibres from the cells of the cords to their ultimate distribution, it is evidently wiser not to bridge the interval by using half the diameter of the nerve and longitudinal splicing, as has been done, to restore the continuity of tendons. This must leave still more modelling and differentiation of reparative material to be done, and injures the nerve still further. It is, however, not necessary to use nerve tissue at all, as in April of last year Mr. Piek joined the ends of a median nerve, separated by more than an inch, by dissecting a strip of cicatricial tissue from the upper end of the nerve. This operation was successful, and both sensation and normal nutritional action with motion came back after a long interval, during the earlier part of which, of course, it would be impossible to tell whether a successful issue would result or not. Again, other cases in which normal nerve action has been resumed, after stitching ends which will not come together within an inch or more with catgut, show that nerve material may be trained, as it were, along a framework of neutral material, but, of course, only after a long interval of time. Now, when the nerve of another animal is used as the connecting link, the question of success or failure is soon decided. This is an important matter as regards the patient's time, and also as regards the degenerative changes in the divided ends of the nerve.

On April 11th of this year, T. C., *æt* 27, fell from a ladder, his right arm passing through a plate-glass window, the glass being first broken by the hammer which he held in his hand. The result was a wound of the front of the forearm, in which the muscles were extensively divided rather below the junction of the middle and upper thirds, and the ulnar nerve and artery completely severed. The wound was attended to by the resident surgeon, who sutured the ends of the nerve with fine silk. Much pain ensued, and the wound suppurated. The pain did not follow the course of the ulnar nerve, but existed apparently all through the forearm, and was especially bad, at times, down the ring finger. The wound healed after some weeks, and

the patient was discharged; but on June 17th he returned to hospital, by my advice, to have something further done. His arm was quite useless. The scarring of the muscles interfered with passive motion a good deal, and there was very little voluntary motion in the fingers at all, although the thumb could be moved. The area of distribution of the ulnar nerve was insensitive to touch and heat. Coldness of the fingers, and wasting of the interossei, were the only nutritional changes. On the 22nd of June, I exposed the ulnar nerve in the upper half of the forearm, at the same time freeing the matted muscles as much as I could. I found an interval of about $2\frac{1}{2}$ inches between the ends of the nerve, which I could not approximate. The upper end was bulbous, the lower frayed out, and much harder to find; small portions were removed from each end, all bleeding stayed, and the wound dressed without any sutures. On the next day I inserted about $2\frac{3}{4}$ inches, or 3 inches, of the sciatic nerve of a live cat, which nerve has about the same diameter as the human ulnar, and possesses a tough neurilemma. This piece was placed in hot 1 per cent. salt solution in transferring it from the cat to the man, by Dr. Barrett, of Melbourne. It was bathed with the same solution whilst I sutured it with a stirrup-suture of catgut through the substance of the nerve. This suture has the advantage of a firm hold, at the same time not constricting the whole calibre of the nerve. By removing slight redundancies at either end of the cat's nerve, very accurate apposition was effected. The skin was carefully sutured so as not to be adherent to the parts below, and the wound healed with no discharge of any kind. The same night there was much pain in the forearm, but after this very little pain at all. On the eighth day the dressings were removed, and the patient thought he could feel in his little finger, but it was doubtful. Five days after this sensation was well marked in the ulnar area, and the situation of the part touched fairly accurately noted. There was no transferred sensation. The patient's eyes were blindfolded during the testing, and the arm was resting on a support. In a few days sensation was normal, and the patient left the hospital. The weather became very cold at this time, and sensation left the top of the little finger suddenly, and two days after was undoubtedly diminished elsewhere. Warmth was applied, and by the 26th July feeling was everywhere restored. Motion of the fingers has returned more slowly, but now the patient has excellent use of his arm. Sensation is normal all over the limb, and motion nearly as good as before the accident—the deep matting of the muscles still interfering to some extent. I may say massage was used early, and did temporary harm, as sensation was dulled by it.

At the meeting of the Clinical Society of London, on March 11th, of this year, Mr. Harrison related a case of nerve grafting into the median when sensation returned in forty-eight hours. In my case the patient stated he was sure he could feel as early as this, but I did not put him to the test, as I wished to leave the arm entirely alone and not to interfere with the temperature. It appears from Mr. Harrison's paper that there are ten recorded cases of nerve-grafting, three of which were perfectly successful, others partially so. The operation is, I think, a very useful one. If not successful, it places the patient in only a very slightly worse condition, because of the freshening of the ends, and it does not waste valuable time. Small hiatus may be filled up by simply refreshing the ends, but a long time ensues before any result can be gauged. Large intervals can only be filled by nerve-grafting. In the case I have just detailed to you, I believe the successful result was aided by the hot saline bath and the fact that the part was exposed on one day and the new nerve inserted on the next, when all bleed-

ing and serous oozing had stopped and the parts were in a receptive condition. It was interesting to note how easily the conductivity of the new nerve was interfered with by cold, and also by early massage. Apparently the new nerve is able to carry sensory impressions as early as forty-eight hours after operation before any but undifferentiated plastic material can have been formed, and also that while in uninjured nerve there is a direct continuity between the periphery and the spinal cord, an accommodation takes place after a longer or shorter time amongst the various fibres in the graft by which sensation is referred to the proper peripheral area. In Mr. Mitchell Banks' case, as quoted by Mr. Harrison, there was a transference of sensation for a time, so that the finger really touched was not the one felt to be touched.

An Inquiry into the Results, immediate and remote, of Tapping Hydatid Cysts.

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It is well known that in our profession diverse views obtain as to the best treatment of hydatid disease. We are probably all agreed that a radical operation, comprising incision and drainage, is alone suitable for suppurating cysts, for hydatid tumours filled with daughter cysts, and probably for disease affecting the lungs.

Our inquiry is alone directed to the treatment of simple cysts, more especially if situated within the abdomen. On this point a divergence of opinion exists, many practitioners of experience regarding the tapping of such cysts as uncertain, dangerous, and only occasionally curative. These medical men advocate incision at once in all cases. The other section hold that tapping is advisable, safe, and sufficiently often successful, and that it ought, at any rate, to be tried before resorting to more extensive proceedings. With a view to gain reliable information bearing on the points at issue, we sent out the following circular to the profession in Australia asking for certain information under the following heads:—

Name; age; sex; seat of disease; number of tapplings; calibre of needle; antiseptic precautions; quantity and quality of fluid withdrawn; condition of patient immediately after tapping; remote result; remarks.

The results of this inquiry we now desire to present to this Congress:—

Number of contributors	...	...	...	...	27
Total number of cases	...	...	...	...	193
Number of abdominal cases	...	...	...	...	156
Number of thoracic cases	...	...	...	..	32
Number of other parts	...	...	...	...	5

Owing to the omission to supply important particulars, or to the fact of other methods than aspiration or tapping having been adopted, the total number of cases available for this inquiry is reduced to 146.

Abdominal and thoracic cases.—Of this number (146), 109 were treated by simple or aspiratory tapping with a needle of $\frac{1}{16}$ in. or less, whilst 37 were treated by simple or aspiratory tapping with a needle of more than $\frac{1}{16}$ in. diameter.

Immediate mortality.—One case only died within twenty-four hours from shock, a mortality of little more than $\frac{1}{2}$ per cent. We shall have something further to say on this point later on.

Recoveries.—Of the 109 cases (which included thoracic as well as abdominal), in 64, or 58·7 per cent., there was no return of the tumour at periods between 5 months and 16 years; in 19, or 17·4 per cent., incision and drainage were ultimately required.

Abdominal cases only, needle $\frac{1}{16}$ or less.—Excluding thoracic cases we have 118 abdominal cases, and of these 89 were treated by simple or aspiratory tapping with needle $\frac{1}{16}$ in. in diameter or less, of which 58, or 65.1 per cent., were free from tumour at periods between 6 months and 16 years after; 53 of the 89, or 59.5 per cent., were free from tumour at periods between 1 and 16 years after.

Radical operation required.—In 12 cases, or 13.4 per cent., incision and drainage were ultimately required.

Shock.—In 50, or 56.1 per cent. of the 89 cases, there was no shock; in 28, or 31.4 per cent. (of the 89 cases), there was slight shock; in 4, or very nearly 4.5 per cent., there was severe shock.

Urticaria.—In 3, or 3.3 per cent., there was urticaria.

Constitutional disturbance (rigors, fever, &c.).—In 8, or very nearly 9 per cent., there was constitutional disturbance.

Suppuration of sac.—In 3, or 3.3 per cent., the sac suppurred.

So much for cases dealt with by a needle $\frac{1}{16}$ or less in diameter.

We now turn to the consideration of cases of abdominal hydatid, treated with needles over $\frac{1}{16}$ in. in diameter.

Recoveries.—There were 37 in this class; of these, 15, or 40.5 per cent., were free from tumour at periods between 1 and 8 years after the operation.

Radical operation required.—Nine, or 24.3 per cent., required incision and drainage.

Shock.—In 8 of the 37 cases, or 21.6 per cent., there was no shock; in 17, or very nearly 46 per cent., there was slight shock; in 2, or 5.4 per cent., there was severe shock.

Urticaria.—No case mentioned.

Constitutional disturbance.—In 8, or 21.6 per cent., there was constitutional disturbance.

Suppuration of sac.—In 4, or 10.8 per cent., the sac suppurred.

Early second tapping.—Of the 118 cases of abdominal hydatids treated by simple or aspiratory tapping, 5, or 4.2 per cent., were tapped again or incised within two months.

Antiseptic precautions.—In the 89 abdominal cases (needle $\frac{1}{16}$ or less), full antiseptic precautions were taken in 66, or nearly 74.2 per cent.; modified in 5, or 5.6 per cent.; incomplete or none at all in 20, or 22.4 per cent.

Of the 66 abdominal cases in which full antiseptic precautions were observed (needle $\frac{1}{16}$ or less), 44, or 66.6 per cent., recovered; in 12, or 18.1 per cent., the tumour returned; in 2, or 3 per cent., the patient died: 1 of shock; 1 after two months, tapping having been repeated.

It may be of interest to note the results in Pulmonary Hydatid Disease. Our cases number 27. Of these 15, or 55.5 per cent. recovered; 10, or 37 per cent. required the radical operation subsequently, and in 2 it is known that the cyst refilled. Of these 27 cases, 2 showed alarming symptoms at the time of tapping, but no death occurred as an immediate result. In 13 there was either no shock or very slight. Urticaria is not mentioned. Four suppurred. In nearly all these cases full antiseptic precautions were observed.

It may naturally be asked what about the enormous amount of material which the metropolitan hospitals must contain. No doubt a vast number of cases have been there dealt with, but in past years, before these hospitals and

their staffs had the various advantages which come of their affiliation to a medical school, only very meagre records were kept. At the Prince Alfred Hospital we took much trouble to get out the results, but two factors made our observations of little value: 1st., The wandering habits of the poorer classes, and the faint mark left by their sojourn in any particular place made their subsequent careers very difficult or impossible to trace; 2nd., The records in the earlier years, and to a large extent we are sorry to say even up to a recent date, supplied but little information on many points asked after in our circular of questions. A very large proportion of the cases are, therefore, inconclusive or incomplete. We, however, think it best to report the result of our inquiry at this institution; eighty-two cases existed which came within the scope of the investigation. We have tabulated them as follows:—

	No. of Cases.	Cured, 1 to 7.	Incision. required.	Collapse during Tapping.	Pyrexia.	Urticaria.
Complete cases, subsequent history known.	12	9	3	.....	.....	.....
Incomplete cases, subsequent history unknown.	40	.....	.....	10	22	3
Doubtful cases, believed to have recovered.	4	4	.....	.....	.....	.....
Died during, or as an immediate result of tapping.	4	.....	.....	.....	.....	.....
Cases requiring incision after previous tapping either in or out of Prince Alfred Hospital.	22	.....	22	.....	.....	.....
Totals	82	13	25	10	22	3

Of the cases requiring subsequent incision, one was that of a man of 24, who, during aspiration of a lung cyst, showed suffocative symptoms demanding immediate incision; eight are definitely stated to have contained pus on being opened.

Of the four fatal cases some more definite statement is required.

(a) One was that of a man of 70, with a liver cyst, who died the day after aspiration, collapsed; details of this case are wanting.

(b) A man of 66, who died twelve hours after the removal from a liver cyst of a small syringe full of fluid; half a pint of hydatid fluid was found in his abdomen; the fluid did not come from the puncture; the liver was full of cysts; the lungs also contained several.

(c) A patient of 30 died during aspiration of the lung; cyst burst into a bronchus and suffocated him; in this case the needle was over $\frac{1}{16}$ inch.

(d) A man, aged 33, with cysts in liver and abdomen; died in a few hours after the withdrawal of a hypodermic syringe full of fluid from the liver cyst; patient had jaundice and hæmorrhage from the bowel, and was in a very bad way.

These results are chiefly valuable here in the fact that they contain the record of four fatal cases; certainly, throughout, more evil and less success had attended the performance of tapping than is noted in a wide series of private cases. Probably the average hospital case is a more unfavourable subject than the average case in private. We wish also to distinctly point

out that many of these tapplings in past years were done with too large a needle, and without that almost automatic observance of aseptic methods which now characterises the practice there and elsewhere.

One of the difficulties in the way of learning the true result of tapping cysts is the fact that because they often refill shortly after they have been emptied, many practitioners seem to think that the operation has been unsuccessful, and that more drastic measures, or, at any rate, a quickly-repeated tapping, is called for. Such is not our opinion. In very many cases—nay, in almost all—a free effusion of serum, with some leucocytes in it, takes the place of the hydatid fluid which has been removed; the parasite no longer lives, and nature may be given a little grace to re-absorb what has been thrown out. Though the conditions are not quite analogous, do we immediately re-tap or incise a hydrocele which refills after being emptied and injected? A fair interval, certainly several months—Fagge suggests a year—should elapse before further proceedings are taken in the cases of simple cysts, which, being tapped, fill and remain large.

Lung Cysts.—In spite of our statistics evidencing the fact that these tumours may be cured by aspiration, the more so that they are so frequently simple cysts, we think that the special risks of tapping are so considerable from the chance of a sudden rupture into a bronchus, and the advantages of incision so prominent, that we would not advocate the former procedure in such cases. Our contention applies only to simple abdominal cysts.

Calibre of Needle.—On the small size (less than $\frac{1}{16}$ inch) of the needle we lay the greatest weight. In past days much of the evil and risk of tapping was due to huge needles being used. Lateral holes in the cannula are an advantage. Our statistics bear out the view that greater success and greater safety lie in the use of a needle $\frac{1}{16}$ or less in diameter. This we repeat is a point of much importance, for the larger the needle, the fewer cures, the greater the shock and the chances of suppuration.

Asepticism.—It would seem almost needless in these later days to insist on this were it not within our knowledge that a forgetfulness of the principles systematised by Lister is not seldom the cause of failure or disaster. The disinfection of the skin, and the sterilisation of the instruments and cleansing of the hands are points of importance.

Rest.—Tapping being no light matter, a patient should stay the better part of a week in bed after its performance, and firm pads and a bandage should be applied over the region of the emptied cyst. We are satisfied that a considerable risk is run, too, by early getting about after tapping.

SUMMARY.

1. In cysts packed with daughter cysts, in suppurating hydatids, and in lung tumours, reliance on tapping is inadvisable.
2. In all presumably simple abdominal cases tapping should be given a fair trial before proceeding to radical measures, nor should we interfere again too soon simply because the cyst continues large.
3. The alarming symptoms, such as pain, rigors, urticaria, pyrexia, are in a great number of cases the result of the application of the method to unsuitable cases, the use of too large a needle, or a non-observance of strict asepticism.
4. The operation is not absolutely without risk, even in the most careful hands, but it is nearly so. We must not be unmindful, however, that even the withdrawal of a hypodermic syringe full of fluid may, in rare cases, cause death, hence no one should use a syringe in his consulting-room.

5. The operation is one, which, in the hands of persons not specially skilled in surgical methods, if cleanly and carefully performed, is not ever likely to do so much mischief as the more complicated procedures of incision may bring about in the hands of those who are not practised in the technique of surgery in general, and hydatid operations in particular.

6. Tapping, carefully performed, even without success, and when not followed by suppuration, does not place the patient in a more unfavourable position for a subsequent radical operation.

7. As to mortality, when we consider that the mortality of radical measures varies from 10·29 per cent. in Lindeman's method to 48 per cent. by Simon's (Davies Thomas), we may fairly give a wise and carefully-performed tapping a trial in suitable cases. A method which, in our series of 193 cases, only shows one immediate death—and even the exceptional record of four deaths at the Prince Alfred Hospital in eighty-two cases, considering the conditions under which they occurred, affords no justification for abandoning the use of so valuable a method of treatment—is surely worthy of trial before the adoption of graver measures.

Cerebral Hydatids.

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IN the course of my medical work in South Australia four cases of hydatids of the brain have been under my care. This rather unusual experience has given the disease a special interest to me. At the last session of the Inter-colonial Medical Congress, I reported the first case in which the complaint had ever been diagnosed, and the parasite evacuated. I will now record two other examples which have come under my notice during the present year; in one of which the nature was recognised, the situation localised, and the cyst removed. I will also tabulate several other instances collected from various sources, as an addendum to the paper on this subject published by Dr. J. Davies Thomas in the transactions of the first session of our Congress, and discuss some points which have suggested themselves to my mind.

Hydatid Tumour of the Brain.—Removal by Operation.—Death.

W. E., a boy, *æ*t. 9 years, living at Cradock, South Australia, was first seen on January 30th, 1892. About two years ago he gradually lost the use of his right hand, and the power in the arm has since then steadily diminished. About the same time the right leg began to get weak, sometimes he gets giddy and vomits, but very rarely, generally when he excites himself. He has always had a large head, and has been very nervous. Heart, lungs, and kidneys healthy. The lad can talk very well, and seems mentally capable. His hearing and sight are unaffected. The pupils are equal and react to light and convergence, ocular movements and the fundus are normal. There is some facial palsy on the right side. There is considerable loss of power in the right upper limb, especially in the movements of the hand and fingers. The left hand presses 20 kilos., the right 5. The right leg drags somewhat, but the patient can walk without help. The right patellar reflex is questionably exaggerated. On the left side it is normal; no clonus, no wasting of the muscles. The head when shaved gives the following measurements: circumference over frontal eminences and occipital protuberance, 22 inches; from the junction of the auricle with the head to the corresponding point on the other side, $12\frac{2}{3}$ inches, of which $6\frac{3}{4}$ inches lie on the left side of the sagittal suture, and $6\frac{1}{4}$ inches on the right. There is a distinct bulging of the skull on the left side, beginning close to the sagittal suture, just in front of a line, nearly vertically above the ear and extending as low as an inch above the ear, where it is quite distinct; it gradually fades out anteriorly, and is lost about $1\frac{1}{2}$ inches above and behind the left angle of the frontal bone. It covers an area about $2\frac{3}{4}$ inches horizontally by 4 inches vertically, and is most prominent about $3\frac{3}{4}$ inches above the left meatus. I diagnosed a probable hydatid of the brain, and proposed its removal by operation. Dr. Marten saw it in consultation with me and agreed. On February 10th, at 8.15 a.m., at the Private Hospital, Wakefield-street, after a subcutaneous injection of morphia, gr. 1-12, Dr. Marten administered chloroform and Dr. W. A. Verco assisted me. The head, previously rendered aseptic with carbolic acid, was opened by an

inch trephine, about 4 inches immediately above the meatus of the left ear. The skull was exceedingly thin and without any diploe. The dura-mater was reflected by marginal incision. A hypodermic needle was introduced into the brain, and withdrew clear limpid fluid; an exceedingly thin layer of brain substance, no thicker than a shilling piece, was perforated, and the hydatid fluid escaped, and a large, rather thick and succulent mother cyst was removed by forceps. There were no daughter cysts, but myriads of small white bodies as large as pins' heads were present, and were, with some difficulty, washed out of the cavity in the brain, as they tended so rapidly to gravitate to its depths. The head had to be filled with lotion and then turned completely over so as to make them fall out. They were brood capsules of scolices. A drainage-tube was inserted, the dura-mater stitched round, the button of bone cut into four pieces and replaced, the scalp flap sutured with a slit for the drainage-tube, and the head dressed with abundance of antiseptic gauze and antiseptic wool. The pulse was good when the patient was put back to bed; he was slightly sick at 9:30 a.m.; at 10:30 the temperature was 87; at 2 p.m. T. 103·8, P. 168, R. 52; at 2:30 perspiring very freely; at 3:30 twitching in the left arm occurring every two or three minutes; at 5 p.m. P. 136, R. 44, T. 102·8, conjugated deviation of head and eyes to the left, continually groping and picking with the left hand; right arm lies powerless; is almost unconscious; the wound was dressed; the dressing was soaked through with a watery, very slightly blood-stained fluid which had wet the bedding down to his loins; ordered pot, brom. gr. 4, Tr., Digitalis, min., $1\frac{1}{2}$ every hour; 5:30 p.m., awake, complained of headache, asked for a drink of water, had a little milk and water; 6 p.m., quite conscious, asked for something to eat; P. 176, R. 56, T. 103·4; 7:30, left arm twitching violently, the left leg occasionally; 8 p.m., slept quietly since 7:30; P. 150, R. 56, T. 103·8, patient catches his breath as if sobbing; 9 p.m., P. 220, lateral nystagmus to the right, epileptiform fit while the head was being dressed, quite unconscious; much clear fluid soaking the dressings through; 9:40, died very quietly; T. 106, taken immediately after death. *Post-mortem* at 8:30 a.m. on the 11th; the scalp, portions of trephine button, and dura-mater were *in situ*, and adherent to one another. The dura-mater was rather more firmly adherent to the skull over the highest point of the bulging than elsewhere; and here, *i.e.*, a little below the trephine wound, the pia-mater was adherent to the dura, the left brain had fallen in, and over the surface was a very slight general extravasation of blood. The finger introduced into the cavity seemed to pass right into the ventricles at the base. The brain was set aside in spirit to harden for further examination; but, three days after, when inspected the parts at the base were diffuent and decomposed, so that an absolute and free communication with the ventricles could not be further confirmed. It was seen, however, that the hydatid had hollowed out the lower part of the frontal lobe and pushed its way out to the surface through the sylvian fissure. The cavity was lined by an exceedingly delicate filmy adventitious membrane.

About the diagnosis I felt fairly certain. The general enlargement of the cranium, with the local bulging on the left side encroaching on the motor region for the right arm and leg, must indicate some growth of considerable size. The age of the patient was in favour of hydatids, for, according to Thomas's tables, one-half of all cases occur from 5 years to 15, and one-third from 10 to 15, inclusive. The duration of the hemiplegia, though seemingly considerable, did not negative the diagnosis, for Thomas's tables record instances in which this symptom has existed for periods of eleven, twelve, eighteen months, and two years.

The chief matter for consideration is the mode of death. The operation was begun about 8 a.m. At 10.30 the temperature was 97°; at 2 p.m. it was 103.8°, and remained high till death at 9.40 p.m., when it reached 106.6°. Death was not from shock, in the ordinary use of that term, nor was it due to inflammation, for this could scarcely arise in the time and reach such a height. There seemed to be some grave derangement of the thermotaxic apparatus. So with the pulse: its rapidity increased by 2 p.m. to 168, and before death was 220. By 3.30 convulsions had begun on the left side of the body, and they continued, either general or local, while the patient lived. One circumstance was noted, to which probably great importance attaches, viz.: at the first dressing, seven hours after the operation, a clear watery fluid, very slightly blood-stained, had soaked through all his dressings and his bedding down to his hips. This, I am inclined to believe, was cerebro-spinal fluid, which, through the drainage-tube, had been continually flowing out of the subarachnoid space, and probably also from his ventricles, until his cerebro-spinal nervous centres were left dry. It would be theoretically possible to empty the spinal and cerebral subarachnoid spaces by a drainage-tube passed through the cerebral dura-mater and pia-mater; and where so large a cavity is opened and allowed to collapse, and the pia and arachnoid fall in with the brain, there would be nothing to prevent the subarachnoid fluid from draining into the cavity and out through the drainage-tube. And it would be theoretically possible in this manner to empty the ventricles themselves through the foramina of communication between the subarachnoid space and the inferior part of the fourth ventricle. I am disposed to believe this draining away of cerebro-spinal fluid was the real cause of death in this case. The marked similarity in the mode of death in the other recorded cases of operation strongly suggests the same explanation for them. I have records of eight operations found in various periodicals, of which I exclude two as not being certainly hydatids, viz., Mausell's sub-tentorial cyst, and one operated on by Mr. Fitzgerald, of Melbourne (referred to in the *Annual of Universal Medical Sciences*, Sajous, vol. 2, p. 36), but which eventually proved to be a chronic hydrocephalus. Of these six cases, only one recovered, viz., No. 62, by Graham and Clubbe. This they state to have been not a cerebral hydatid really, though it was intracranial; but to have grown from the arachnoid membrane, pressing the brain away before it. In opening this cyst, therefore, the subarachnoid space would be left intact and its fluid would not drain away, and the case would be free from the symptoms and dangers attending such a condition. Hence, also, may be the success, upon which the physician and the surgeon are to be congratulated.

Three others died in a few hours. No. 64, in six hours, with a temperature of 104° just before death. No. 66, in a few hours, in a violent attack of convulsions; and my own, No. 70, in fourteen hours, with a temperature of 106° and repeated convulsions. These three were probably cases of subarachnoid emptying. A fifth case, No. 68, my own, lived four days; but there, no collapse of the brain and its membranes occurred, because complete adhesion existed between the dura and pia about the part trephined; and a general arachnitis had been established elsewhere, with a thick layer of plastic lymph binding the dura and arachnoid loosely together; and it was from the continuance of this meningitis (which antedated the operation) that the patient died. Another case, No. 67, recorded by Parry, of New South Wales, progressed satisfactorily until the fifteenth day, when there was a slight discharge of clear fluid from the one unhealed portion of the wound and the temperature rose to 103°, then he seemed to improve till

the nineteenth day, when the temperature rose to 104, and death occurred somewhat suddenly on the morning of the twentieth day. The cavity had not properly contracted, but was partly filled with cerebro-spinal fluid of a yellowish-white appearance, as if it contained debris of the softened tissue, but was perfectly free from odour; the rest of the brain and other organs were healthy. This case is a little different from the others, inasmuch as the patient lived for twenty days, and yet, curiously enough, the ending was much after the same fashion, viz., by unaccountable high temperature and comparatively sudden death, unexplained by morbid conditions *post-mortem*. A circumstance rather confirmatory of the theory I propound, as the cause of death in these cases, is that on the fifteenth day, when first the temperature rose, there was a discharge of clear fluid from the wound, and at the *post-mortem* the uncollapsed cavity was found full of yellowish-white cerebro-spinal fluid. Is it possible that on the fifteenth day a communication, perhaps too small to be noticed at the *post-mortem*, had been effected between the cavity and the ventricles or the subarachnoid space; and so the usual symptoms and, unfortunately, the usual result, followed from draining of these cavities?

In order that this point may be cleared up, would any medical man, who may have a case under his care in the future, in which a *post-mortem* follows an operation for cerebral hydatid, specially examine the condition of the ventricles, and the spinal subarachnoid, as to the quantity of fluid contained in them, and as to any communication between the ventricles and the cyst cavity.

In my second case, at the time the *post-mortem* was made I passed my finger into the cyst, and as I supposed, right into the lateral ventricle at its anterior part, and was quite satisfied that a large aperture of communication existed; but as ill fortune would have it, the brain, set aside to harden for more exact examination, became diffuent at the base, and I was not able to be absolutely positive myself, or to demonstrate it. Whether the communication existed at the time of operation I was unable to determine, for the cavity was far too deep to allow the finger to reach the bottom, or to allow of investigation by sight. I am disposed to think it did, because of the enormous drainage within a few hours. Nor would such a condition be very unusual, for on consulting the complete list of cerebral hydatids up to date, no fewer than fifteen were either in the ventricle itself, or had opened its cavity by gradual displacement of the superjacent brain tissue. Thirty-seven were certainly shut off from the ventricle, but of these five had only a mere diaphragm of cerebral matter intervening, three millimetres in thickness, or of "the thickness of a shilling piece." Of the remaining cases, four more probably did communicate, and nine others most likely, did not, while the records of five cases are so meagre it is impossible to say where the cyst was. To sum up then, it appears that of fifty-two cases about which we can speak with certainty, fifteen cases opened into the lateral ventricles, or nearly 30 per cent.; while five cases, or nearly 10 per cent., had an extremely thin layer of brain substance between. That is to say, of every three cases operated on we shall be liable to open the ventricles in one; and in a small percentage of other cases the ventricles will be sealed by so thin and so soft a covering that it will be liable to rupture under a very slight pressure from within.

I am further confirmed in my conviction of the cause of death in these cases, by the mode of death which has followed the operation of draining the ventricles in chronic hydrocephalus. I recognise the want of absolute

parallelism in the nature of the diseases. In the latter, the ventricles are greatly distended, and the channels that join them are widened, hence they would empty themselves very rapidly through a drainage tube. But the difference would probably only be one of degree, and not of kind, inasmuch as the channels are patent enough in health, and therefore in cerebral hydatid to permit the evacuation of all the cerebro-spinal fluid through a tube. The question naturally arises, what shall we do in future operations for cerebral hydatids? Shall we go on with our present method?

Of six cases attacked only one has recovered, and that one was probably extra-cerebral. In view of this appalling mortality should we not seek some other plan? Recognising the possible explanation, that the fatality is due to removal of subarachnoid or ventricular fluid; further, that in one case in every three we shall probably open the ventricle, when this profuse drainage must occur, might we not give up our drainage-tube, and see the effect? I suggest the following plan:—When the cavity has been opened, and the hydatid membrane has been removed (and this is a comparatively easy matter), and the cavity douched out with antiseptics, the dura-mater shall be carefully stitched up, the flap of scalp replaced and accurately sutured all round, and fairly firm pressure be applied and maintained, and thus the cavity be hermetically sealed against the escape of any cerebro-spinal fluid. The application of pressure over the trephine hole is feasible, and may be made effectually. For in the first place, the skin flap is much larger than the trephine hole, and hence there is a wide margin all round this on which the replaced scalp can rest. Moreover, if we suspect a hydatid, we need not use a very large trephine—one an inch in diameter would be quite large enough. There is no need to employ the large two and a-half or three-inch instruments required in the search for and removal of solid growths. The cyst can be easily extracted through a one-inch aperture, and this smaller opening would facilitate closure by adaptation of a carefully stitched flap; and then firm and uniform pressure can be obtained by careful bandaging over the unyielding skull-cap. This is the plan therefore I suggest to operators, and the one I propose to follow when next opportunity offers.

Such a course would be the application of a suggestion made by Bond, of Leicester, with regard to the treatment of intra-abdominal hydatids. He proposes to expose them by laparotomy, open them, remove the membranes, wash them out with an antiseptic, sew them up, return them into the abdomen, and sew up the abdominal wound. He has done it with success. And while, as a routine treatment for cysts which can be conveniently stitched to the abdominal wall and allowed to drain, it seems to me a risk which is not necessary; it is, on the other hand, a procedure which, under some circumstances, might be the safest, and, occasionally, the only one possible, and applied to cerebral hydatids in a modified form, might, as a possibility, accomplish the desired end. The sealing of the wound in the skull is, I am aware, not exactly analogous to the sewing carefully up of the intra-abdominal hydatid; but it is more like returning an emptied and cleansed, but open hydatid, into the peritoneal cavity. Still, even that expedient would be justifiable if every case operated upon by other methods had proved fatal.

Another course might be suggested, viz., the puncture of the hydatid cyst, without incising it, just as hydatid cysts elsewhere are aspirated. If this could be done easily, it would be worth a trial. There are, however, several difficulties in the way. First, the pathological diagnosis is never more than a slight probability. It may be a solid tumour. And so in regard to its

site, unless there is a defined local bulging, the situation is only problematical. Under these circumstances aspiration would be unsatisfactory. Suppose the scalp were incised over the supposed seat of the supposed hydatid, and the skull bored with a watchmaker's drill, and a needle introduced, and no liquid were obtained, what should be done? Is another bore to be put down at another probable spot, and another puncture effected? It seems to me our localisation and characterisation of cerebral tumours is, as yet, too indefinite to allow of such delicate work as this. We want at least a trephine hole to explore through, so as to give us any feeling of certainty, and if we have that we can pass the needle in any direction, and to any depth or distance we deem advisable. If, when we have a trephine hole, we aspirate and find hydatid fluid, what shall we do? Draw off an ounce or two, and then close all up, and leave the membranes *in situ*, and trust to destruction of the parasite by the puncture? This could be done in some cases, and might conceivably be effectual. But it seems like opening an abdomen to see if an hydatid is there, and then through the laparotomy wound, puncturing the cyst, and then sewing up the wound in the abdominal walls, and leaving the hydatid in possession and trusting to it to die. And how many men could curb their surgical instincts to that extent? And so, as few could leave an hydatid cyst in the brain after trephining and aspiration. In some instances indeed, it would not be possible. In two, which have been explored by myself, the layer of superficial brain substance was so extremely thin, that immediately on turning the dura-mater back, and puncturing, even with a hypodermic needle, the needle-hole remained patent, and the hydatid fluid flowed out *pleno rivo*, and there was no alternative but to open up the cavity further and thoroughly evacuate all its contents.

Simple aspiration then, through a trephine wound, is sometimes impossible, and in most cases would be deemed inadvisable. If a distinct local bulging existed, and the symptoms indicated hydatid at that spot, it would be justifiable and feasible to drill there and aspirate, and remove as much fluid as would readily flow spontaneously, or by syphon action, and then close the puncture and await the course of events, in the hope of cure. If, after a lapse of months, no improvement resulted, or if the disease showed signs of progressing, it might be opened and evacuated by trepanning.

Hydatid of the Brain.

F. F., *æt.* 19, male, farmer; residence, Laura, South Australia; was admitted into the Adelaide Hospital, June 16th, 1892, under Dr. Verco. He complained of pain in the back of the head and neck; the former for three months, the latter not quite so long; he attributed his illness to jumping heavily to the ground from a height of 6 feet. Thirteen years ago he received a cut from an adze on the right side of the head; he had felt no ill-effects, but has had pain around the scar for two weeks. The occipital pain was not constant; there were paroxysms of severe pain, which sometimes shoot round to the front of the head. For the last three months he had had "bilious attacks," viz., vomiting and pain in the back of the head; there was often no nausea before the vomiting; the attacks occurred about every three days, and lasted about a day. Giddiness had occasionally been experienced during the last two months, noticed chiefly when stooping, but never causing him to fall. A month ago, while walking, his legs suddenly gave way, and he fell, but he was able to get up the next minute, and his legs felt all right; no fits. Since a month ago the pain has made him keep his head bent backwards, when the paroxysm was present, to relieve it. Speech has not been affected; vision in the right eye has been

failing for some three months. About two months ago he noticed that, though both arms had their usual strength, he was not able to judge rightly of what he was touching; "everything seemed further away than it really was." This condition has left his right hand, and is less in the left; no tingling or numbness; no loss of memory; has had no affliction of the sphincters, and no muscular spasms in the limbs. The mother states he has been somewhat foolish in his talk for a few days; he has had no previous illness, nor syphilis. Both parents, and nineteen brothers and sisters, alive and well, except one sister, who has had hemiplegia.

Present Condition.—He is rather dull and stupid; his answers rational, but slow; robust and healthy; mouth kept open, giving him a stupid expression; posture recumbent, turns about a good deal in bed; the head is frequently bent backward, and rotated, so that the chin points upwards and to the right; temperature normal; pulse 86, regular, full, compressible; artery normal; respiration 18, regular, quiet; skull symmetrical; no bulging; there is a scar about an inch long on the right side of the scalp, just in front of a line drawn vertically upwards from the depression in the front of the ear, immediately behind the coronal suture, and about two inches from the sagittal suture; it is not adherent to the bone, and there is no depression of the bone; the scar is tender on pressure; no tenderness on percussion elsewhere; no tenderness at the back of the head or neck; ocular movements normal; pupils equal, and react to light and convergence; well-marked optic neuritis in both eyes; retinal hæmorrhages, radiating out from the disc in both eyes, and scattered about the fundus, more numerous in the right; vision L., 6/36; R. can only just see the board; ears, never any discharge; often a whistling sensation in both; hearing good; tongue, uniform white fur, protruded in the middle line, not tremulous; no facial palsy; is constantly yawning; heart and lungs normal; liver normal; spleen not palpable below the costal margin; dullness not increased; left kidney palpable, apparently normal; right not felt; the right hand grasps with a power of 33 kilos, left 27; reflexes, corneal present and equal, scapular, epigastric, left abdominal, slight; plantar slight and equal; no ankle clonus; can walk in a straight line, but sways a little; can stand with eyes shut and the feet together, and turn round, but after standing a few seconds he tends to fall over to the left side; mother says when he walks towards an object he always gets to the left of it; sense of touch perfect; sphincters controlled; urine clear, acid, 1010, no albumen; no sign of disease of spinal bones. June 17.—Vomited twice, bile-stained mucus; bowels moved once. June 18.—No vomiting, no pain in the head, or yawning; cannot sit up steadily without support. June 20.—Lies quiet, not so sleepy, scar still tender. June 22.—Memory proved defective; restless last night; fell out of bed twice; tosses about in bed; no vomiting; passed his urine in bed to-day. June 23.—Pain on right side of the head just above the scar; says his left arm feels "stupid"; no vomiting; no pain in the neck. June 25.—Falls out of bed occasionally; knee-jerks somewhat exaggerated; does not twist his head round so much; cannot stand as well as he did; cannot stand with his feet together; he falls backward to the left. June 28.—Very restless last night; more stupid to-day; cannot touch the top of an object with his finger at arm's length, but has sense of position of it with his eyes shut; left palpebral fissure larger than the right; on closing the eyes tightly the mouth is drawn to the right. June 30.—Dynamometer registers 32 kilos in right hand, 20 in left; no myotatic reflexes in arms; legs as before; pain still over the scar, and occasionally in back of neck. July 3.—Vomited yesterday; was drowsy all day; did not complain of pain; slept

well till this morning, and felt well; did not complain of pain, except at the back of the neck; at 11:30 a.m. was just as usual, and took his beef tea; at 11:45 was asleep; at 12:30 was noticed by the nurse to be black in the face, and foaming at the mouth; when seen by the house physician he was in this condition, with dilated pupils; no conjunctival reflex; breathing irregular, shallow, and at long intervals; pulse flickering, and in a few minutes he was dead.

I am indebted to Mr. Mead and Mr. Giles for the above notes.

Post-mortem.—A hydatid, the size of a Tangerine orange, was found in the right hemisphere, at the posterior part; it lay over the posterior horn of the lateral ventricle, from which it was separated by a layer of brain substance about as thick as a shilling piece; it was unruptured, and contained limpid fluid; it came to the surface of the brain at a point an inch below, and an inch behind, the parietal eminence, where the brain tissue was absent over an area of about an inch in diameter, and where the pia-arachnoid and dura were adherent; the rest of the brain was healthy; there was a hydatid, rather larger than the above, in the spleen, and another of the size of a Barcelona nut, in the left kidney.

The following cases of hydatid of the brain have been collected from various sources; they have been abstracted, and the numbers follow consecutively those in Dr. Thomas' list:—

(59.) Dr. W. A. Bailey, *British Medical Journal*, 1886, vol. 2, p. 1217.—Female, *æt.* 2 years, symptoms began fourteen weeks before death, with proptosis of the left eye, and screaming fits at night, eight weeks later a convulsion, the prominent eye was directed downward and forward, movements limited, pupil acted normally; optic disc diffusely swollen, and ill-defined; veins very large, dark and tortuous, vision good; right eye vision normal; fundus normal; liver bossy; six days later a second fit, and nine days afterwards convulsions for more than two hours; temperature rising from normal to 104.2 within six hours; and death twelve hours later. The convulsions began on the left side, though the movements were shortly transferred to the opposite side; then the right hand was clenched, and there was a continuous jerking movement backwards of the hand and arm; the right leg was slightly convulsed; the right eye was turned to the left, and its pupil was widely dilated; the eye was much congested, and protruded, and jerked slightly. *Post-mortem.*—A cyst, the size of a Tangerine orange, was embedded in the posterior superior part of the right cerebrum, where it shelled out easily from beneath the unaffected pia-mater. It occupied the region of the right angular gyrus, and sub-marginal convolution; one as large as a walnut, within the substance of the left superior rectus muscle, liver much enlarged, thirty-six cysts mostly as large as a pigeon's egg. Lungs contained about twenty; the spleen one; the right kidney one; and the left ovary a small one; they were the cysts of *tenia echinococcus*.

(60.) Dr. Hermann Weber, *British Medical Journal*, November 10, 1881, p. 1046.—Male, *æt.* 22, severe pain over the whole head, with nausea and vomiting; rather apathetic, but not unconscious, some diminution of power over the whole of the left side, and especially of the external rectus muscle of the left eye; well-marked double optic neuritis (choked disc), and vision much impaired. The movements of the tongue and the sphincters were unaffected; temperature rather below than above normal; pulse normal; sudden death within six days from the beginning of the symptoms, and on the twelfth day after admission into the German Hospital. *Post-mortem.*—

Large hydatid cyst on the posterior part of the left hemisphere, "The slight hemiplegic symptoms had been on the side of the lesion, not on the opposite side."

(61.) Dr. Ratcliffe, *British Medical Journal*, May 17, 1890, p. 1135.—Male, had three fits before admission, preceded by headache and pain in the abdomen; then loss of consciousness lasting about five minutes; during which time the legs kept twitching. After the attack he was dazed, and the speech slurred. The pupils were widely dilated throughout, and there was severe double optic neuritis and internal strabismus of the left eye; there were sickness and vomiting from admission till death. He had occasional twitching of the left arm and leg, and a peculiar cry. He died on October 26. *Post-mortem*.—Single cyst, of the size of an orange, occupying the greater part of the right frontal lobe. On the orbital surface, the gray matter had thinned and given way, exposing the cyst, the convolutions over it were much compressed, as was the left frontal lobe. The cyst came away easily, and contained nine ounces of clear fluid, with large numbers of hydatid scolices; no other cysts were found.

(62.) James Graham, in "Hydatid Disease," 1890, p. 113.—C. G., *æt.* 16, forgetful some weeks before admission to hospital; intense frontal headache on waking; and on rising giddy and sick; then loss of all power in the legs; almost complete loss of vision; for some days afterwards improvement, vision slightly improved in right eye, not in the left; power of walking regained, but weak in the legs; admitted to hospital, in Sydney, January 20, 1890; somewhat staggering gait, unable to stand, with eyes shut, arms normal; superficial and deep reflexes normal; taste, hearing, smell normal; eyes rather prominent; pupils widely dilated, and insensible to light; the left drooped slightly; post-neuritic atrophy both eyes, veins large, arteries small; exudation more widespread in the left than in the right; three weeks after admission had a fit, the movements more marked on the right side; and for some days he was mentally dull, had no perception of light; general weakness of the right side, and some dragging of the left leg; the face was slightly drawn to the left, there was no asymmetry or bulging or softening of the shaven head; Mr. Clubbe trephined over the left parietal eminence, and removed a cyst, holding nineteen ounces of fluid; growing from the arachnoid membrane; after a month the use of the limbs was perfect; his mental condition improved; his pupils reacted to light, but vision did not return.

(63.) Dr. Watson Munro, "Hydatid Disease," Graham, 1890, p. 115.—Male, *æt.* 17 years; in Sydney Hospital; suddenly lost his sight after a fit of shivering, accompanied by an attack of vomiting and severe headache three months before his admission into the hospital. On admission there was constant intense pain at the back of the head, shooting down the neck and back. There was the risus sardonius, but no distinct form of paralysis of motion or sensation. The eyes slightly protruded, the pupils widely dilated and insensible to light. Double optic neuritis, and paralysis of the internal rectus of the left eye. Troublesome cough, but careful examination of the lungs revealed nothing unusual; liver normal; three convulsions in rapid succession, and death in a state of coma. *Post-mortem*.—Hydatid cyst, size of a hen's egg, in the occipital lobe of the cerebrum on the right side. The adjacent part of the bone was unaffected by pressure. The cyst was entirely covered by brain tissue. In the right lung were two small hydatids, of the size of a walnut, and a similar one in the left lung.

(64.) Dr. Jenkins, "Hydatid Disease," Graham, 1890, p. 118.—Female, *æt.* 7 years; Sick Children's Hospital, Sydney. Eighteen months before

admission right arm gradually became powerless, then the right leg grew weak, and later headache and vomiting came on. On admission, well nourished, bright and active. Right arm was helpless, but by strong effort could be raised to the level of the shoulder; right hand fixed at the wrist, and the elbow distinctly rigid; great rigidity of the right knee, and increase of the knee jerk; no ankle clonus, no wasting of the muscles, no alteration of sensation; hearing, taste, and smell normal; and the sight seemed good. The mouth was drawn to the side on laughing, but the tongue was protruded straight, and the uvula and soft palate were in no way affected; no paralysis of ocular muscles; double optic neuritis slightly more marked on the left side. The head seemed unduly large, but symmetrical; $22\frac{1}{2}$ inches in circumference above the ears. On the right side of the head, at the coronal suture, the bones seemed to be slightly separated; percussion gave a peculiar hollow note over the left parietal eminence; Dr. Chisholm trephined over the upper portion of the fissure of Rolando, on the left side. The bone was about $\frac{1}{8}$ inch thick; the hydatid cyst was removed; there were no daughter cysts; dressed antiseptically. The patient quickly recovered from the effects of the anæsthetic, and recognised and named some of the people about her, but she died very suddenly six hours after the operation; the temperature rising to 104 shortly before death. *Post-mortem*.—The cyst occupied a large part of the medullary centre of the left hemisphere.

(65). Springthorpe, *Australian Medical Journal*, 1890, p. 513.—Female, æt. $10\frac{1}{2}$. Symptoms began twelve months ago; right hemiplegia, first in the leg, next in arm, then the face; paroxysmal frontal headache, with vomiting, giddiness, and twitching of the muscles of the right side; then sight failed; then tongue-biting, and stammering; then incontinence of urine, head large, forehead prominent, intellect normal, right optic atrophy, no choroiditis, only perception of light; paresis of right face; right arm contracted, hand cold and discoloured; right leg weak, with marked ankle clonus; sensation normal; left arm and leg almost constant movement; hearing less acute in the right ear, some glycosuria; tenderness over left Rolandic area, and yielding of the bone; later, epileptiform convulsions occurred, then paresis of the left leg; patient died suddenly of acute hydrocephalus. *Post-mortem*.—Thinning of the skull over the upper part of the parietal and back part of the frontal bones of the left side, with distinct bulging, with thickening and adhesion of the dura-mater here; left lateral ventricle greatly enlarged and distended with serous fluid, in which floated a free hydatid cyst, unruptured, as large as an orange, and containing many scolices, some dilatation of the right lateral ventricle.

(66). Dr. T. Escher, *Lancet*, June, 1891, p. 1444, Surgeon to the Spedale Civico in Trieste.—Hydatid in right cerebral hemisphere, under his care in 1888; child eleven years old; for eight years epileptiform convulsions, and other symptoms of a tumour involving the right cerebral hemisphere. A preliminary exploration with a syringe established the diagnosis of hydatid. The skull was trephined, and a very large cyst explored, containing many daughter cysts, involving the greater part of the right frontal and parietal lobes; these were removed. The patient never recovered consciousness after the operation, and died in a few hours in a violent attack of convulsions.

(67). Parry, *Australasian Medical Gazette*, Aug., 1892, p. 315.—Male, 9 years; symptoms began eight months ago, with occasional dimness of vision, giddiness; headache increasing, paroxysmal, referred to forehead and vertex; vomiting; six months later paraplegia and paralysis of the left arm, and blindness; pupils dilated and immobile; discs atrophied, veins large, arteries

small; patellar reflexes present, but diminished; no anklo clonus, no softening or bulging of the skull, but a peculiar hollow note on percussing over the upper part of the Rolandic area, $1\frac{1}{2}$ inches to the right of the middle line; trephined over the upper part of fissure of Rolando; cyst found at a depth of less than $\frac{1}{2}$ inch from the surface; removed, drainage-tube fixed; wound healed at greater part by first intention; temperature for fourteen days not above 99; pupils reacted, but no vision returned; movement returned to lower limbs, and in less degree to left arm; on 15th day slight discharge of clear fluid from the one unhealed portion of the wound, and temperature rose to 103; seemed to improve till the 19th day, when the temperature rose to 104; death somewhat sudden on the morning of the 20th day. *Post-mortem* thirty hours after; cavity in medullary centre of right hemisphere; opening in posterior part of ascending frontal convolution; both that and the ascending parietal convolution were considerably thinned; the cavity had not properly contracted, but was partly filled with cerebro-spinal fluid of a yellowish-white appearance, as if it contained debris of softened cerebral tissue, but was perfectly free from odour; the rest of the brain and other organs were normal.

(68). Dr. J. C. Verco, Intercolonial Medical Congress of Australasia, Trans. of 2nd Session, 1889, p. 377.—Male, 10 years; large head always; pains in the head for five months; night screams three months; sighing; three fits, vomiting occasionally, incontinence of fæces and urine one week; head 24 inches round, some bulging in the right temporal and parietal region; slight left facial palsy; vision nearly lost, double optic neuritis; both arms weak, left most so; legs very weak; pyrexia during the week while under observation; operation, hydatid removed, contained 16 ounces; several daughter cysts; death in four days, with symptoms of meningitis, which he manifested the preceding week. *Post-mortem*.—Cavity in right frontal lobe lined by stent adventitious membrane, presenting in fissure of Sylvius and there adherent to dura-mater; general, plastic arachnitis.

(69). Dr. J. C. Verco, International Medical Congress of Australasia, 3rd Session, Sydney, p. 388.—F.T., male, 19 years. Pain in occiput and nucha three months, with exacerbations, vomiting, giddiness, chiefly on stooping, vision very dim, some inco-ordination of the left hand, marked optic neuritis; death sudden, apparently in a fit. *Post-mortem*.—Hydatid, size of Tangerine orange, in right posterior cerebral hemisphere, very thin layer of brain between it and the ventricle, pia and dura adherent, and brain at surface absent below and behind parietal eminence, hydatid in the spleen, and in the left kidney.

(70). Dr. J. C. Verco, Intercolonial Medical Congress, 3rd Session, Sydney, p. 383.—W.E., male, 9 years. Right partial hemiplegia, most marked in hand, onset gradual two years, occasional giddiness and vomiting, slight right facial paralysis, bulging of the skull on the left side, operation by trephining, cyst removed containing 16 ounces; death in fourteen hours, with high temperature and convulsions. *Post-mortem*.—Hydatid cavity in left frontal lobe.

On the Treatment of Abdominal Hydatids by the Injection of a Solution of Perchloride of Mercury.

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As the treatment of hydatid cysts is always interesting, I bring before this Congress the notes of a few cases, which are briefly as follows:—

Case 1.—D. P., aged 7 years, a thin lad of cheerful disposition, seen first on July 5th, 1887, complaining of a swelling in the right side. His family history was good, and he had always enjoyed good health, save for an attack of low fever he had had two years before. His mother noticed that he was ailing and getting thin for two or three weeks, and that he complained of pain after eating during the last two or three days. The swelling was only noticed about two or three weeks. There was very great prominence of the hepatic region, the superficial veins being enlarged and plainly visible. The lower right ribs projected and the intercostal spaces bulged very much, and on percussion a thrill could be felt. The liver dulness extended for seven inches just within the right mammary line, from half an inch below the nipple to half an inch above the level of the umbilicus. There was no redness or tenderness. At the epigastrium the circumferential measurement was $23\frac{1}{2}$ inches. The heart's apex beat was felt just below the left nipple and the sounds were normal. The urine was normal. He was seen again on August 17th. I should mention that he lived 20 miles out of town, and I was only able to see him at intervals when he was driven in to me. On the last date the swelling had increased, and the circumferential measure was $24\frac{1}{2}$ inches. On that day I introduced a fine hypodermic needle in the eighth intercostal space, and about three drachms of a clear transparent fluid ran out. I then injected through the needle one drachm of solution, containing $\frac{1}{32}$ grain of perchloride of mercury. He vomited almost directly afterwards, but was able to journey home a few hours after. He was brought in again on the 23rd, six days after, when I was informed that he had had a cold. He was feverish, with a furred tongue, cough, and his bowels were loose. The swelling was evidently less and also less tense; circumferential measurement, 24 inches, and the dulness only extended 5 inches in the vertical line, and to a level 1 inch above umbilicus. I saw him again on September 12th, when he was improving, and again on October 11th, when I noted that he was gaining flesh. Measures $23\frac{1}{2}$ inches, and there was less fulness of epigastrium and less bulging of intercostal spaces. When seen on December 21st (four months after the injection) he was much improved, and there was no bulging of right intercostal spaces nor below the margin of ribs. The edge of the liver, quite thin, could be felt midway between the epigastrium and umbilicus. The hepatic dulness in right mammary line only measured $2\frac{1}{2}$ inches and the circumferential measurement was $22\frac{1}{2}$ inches. The heart's apex beat was $\frac{1}{3}$ inch within the left nipple line. He had no complaint to make and could run well.

On February 4th, 1888, he was equally well. I last saw him on April 9th, 1892, when he was perfectly well and all signs of the swelling had disappeared. This was nearly five years after I first saw him.

Case 2.—B. O'K., a thin but bright-looking girl, aged 8 years, complaining of no pain, but with a swelling in the abdomen. She had always been a delicate child but never seriously ill. I saw her first on February 29th, 1888. She then had a large hydatid cyst in the right lobe of the liver, presenting chiefly between the right margin of ribs and the umbilicus. She was treated medicinally for a time with iodide of potassium and bisulphite of soda. As she lived 30 miles out of town she could only be seen at somewhat lengthy intervals. However, the cyst gradually increased in size until June 8th, when it reached $1\frac{1}{2}$ inches below the umbilicus, and the heart's apex beat was then one-half inch outside the left nipple line. On the 14th she was tapped, drawing off 23 ounces of cloudy fluid, and a solution of tannic acid was injected. This was followed for a few days with considerable febrile reaction, which had passed off by the 23rd, when she went home for a time. The swelling, which had subsided after the tapping, was increasing again. I next saw her on July 14th, when I found she had fallen away a good deal, and the swelling was as large as ever and very tender. On the 15th I drew off about a pint of thick creamy pus, and on the 26th, as the swelling had increased again, I opened it freely, under chloroform, to the right of and a little above the umbilicus. She mended very slowly after this and the cavity contracted exceedingly slowly, so that on October 5th I sent her into the hospital, when there was a sinus left over two inches long with a purulent and shreddy discharge. On October 26th it was noted that there was marked protrusion of the right lower ribs, and that the intercostal spaces were bulging and the superficial veins were more marked, and that the sinus was discharging as before. The measurement at epigastrium was $23\frac{3}{4}$ inches. On the 28th the protrusion was even more marked, and I introduced an hypodermic needle in the sixth interspace, just outside right nipple line, and 4 drachms of clear transparent fluid, just like pure water, ran out. One drachm of solution, containing $\frac{1}{8}$ grain of hydrarg. perchl., was then injected through the needle. She then measured at epigastrium $24\frac{1}{4}$ inches. This was followed by considerable reaction, vomiting, and purging, the temperature going up to 102.6 F. and pulse to 144. The swelling gradually diminished, measurement being 24 inches on October 30th and $23\frac{1}{2}$ inches on November 3rd. On November 4th (seventh day) the temperature was normal, pulse 120, tongue cleaning, and appetite improving. All this time the sinus was discharging healthy pus. There had been no signs of salivation. On November 14th the measurement was $22\frac{3}{4}$ inches, and on the 28th $22\frac{1}{4}$ inches. The liver was gradually returning to its natural shape. On January 4th, 1889, whilst I was irrigating the sinus she was suddenly seized with severe abdominal pain and vomiting. I believe some of the weak Condy's fluid, which I was using with some force, passed into the peritoneal cavity. However, she had a sharp attack of peritonitis, with high fever, urgent vomiting and hiccough, and swelling of the abdomen, which nearly proved too much for her. She was again convalescent by January 28th, and by February 23rd, 1889, when I sent her home, the sinus was only $\frac{3}{4}$ inch deep, and only two or three drops of pus were discharged in the twenty-four hours. Three weeks after going home the sinus was quite closed. I saw and examined her on September 17th, 1890, when there was a small depressed scar, the size of a sixpenny-piece, above and two inches to the right of the navel. There was no apparent enlargement of the liver and she was in excellent health. I have

heard from her relatives quite lately that she has kept well since; that is, three years and ten months after the injection of the perchloride of mercury.

Case 3.—A.L., aged 8½ years; was and had always been a thin delicate child. In September, 1889, I saw her when she was suffering from jaundice (catarrhal as I thought then), from which she made a good recovery apparently in about a fortnight; no enlargement of the liver at that time. Seventeen months after, on 17th February, 1891, she was again brought to me with a painless swelling in the abdomen. Her mother informed me that four months before this she had complained of pain in the right side and under the right shoulder, and that there was a swelling then about the hepatic region which she poulticed, after which she thought the swelling went away. Five days ago the pain returned, and the swelling was again noticed. She was a thin emaciated fair child, but with healthy appearance. There was a decided prominence in the region of the liver, and a strange rounded and hard prominent swelling just about the navel—this latter was about the size of a closed fist, smooth surface, not tender, and was continuous with the enlarged liver; it caused the navel to be everted; it was movable to some extent. The liver was enlarged reaching three inches below the margin of the ribs, its surface smooth and hard, and it seemed to be quite continuous with the rounded swelling. The upper edge of liver dullness was not apparently raised; there was no tenderness or pain; the heart's apex beat was pushed up, being just below left nipple. The swelling was tapped with a hypodermic needle one inch below umbilicus, and about half an ounce clear watery fluid drained away, and ½th grain of hydrarg. perchlor. in solution injected. She vomited immediately afterwards; in the evening her temperature was 102 F., and pulse 144. During the night she vomited frequently, but by the 21st (four days after), the feverishness had passed away and the stomach was settled. On the 19th and 20th an urticarial rash appeared, and on the evening of the 21st she had very severe pain in the epigastrium, which was followed by the appearance of the rash again; she had no diarrhoea after the injection. The swelling in the meantime was diminishing, so that five days after the injection her girth measurement was 1 inch less, and on the 23rd (six days after), the lower margin of the dull area was almost parallel with the costal margin, and about 2 inches below; there was still some prominence about the navel. On the 28th she went to her home, 25 miles from town. I saw her again on 16th March, when she had improved in general health, but the swelling and liver dullness were about the same. From this she went on improving, so that her mother did not bring her into town again until 5th May, when she was looking exceedingly well, and I noted abdomen full soft and tympanitic; the swelling about navel gone; some hardness to be felt just below right margin of ribs, but edge of liver could not be distinguished. Liver dullness in right mammary line was 2½ inches, reaching half an inch below margin of ribs. In March, 1892, I saw her mother, who informed me that she was in excellent health, and that there was no swelling at all visible. That was fourteen months after the injection. I have used the perchloride of mercury solution for injection in one other case, a boy aged 15 years, who had a cyst in the neighbourhood of the spleen; but as I had good reason for believing that the cyst broke into the stomach, the case would not be a suitable one to bring before you as testing the efficacy of the injection in causing the death of the cyst. The boy, however, made a good recovery, and is now, more than two years after treatment, in good health, active, and gaining his own living.

REMARKS.

The three cases I have brought before you have all recovered, and apparently are cured. Five years, three and three-quarter years, and seventeen months have respectively elapsed in these cases since they were treated, and they are now all in good health.

Dr. Graham states that a cyst has been known to refill, even as long as ten years after the patient was believed to be cured. I would ask is that a fact, and I should certainly require the best of evidence before believing it. Without a *post-mortem* examination it would be almost impossible to prove that it was not a second cyst growing, and that it was a refilling of the original cyst. My own opinion is certainly in favour of a second new and independent cyst in many of those cases in which it is stated that a cyst has refilled after a reputed cure and after a long lapse of time.

In the second case recorded above, I feel certain that a second cyst grew and increased in size whilst the first was under treatment, and that the second was cured by the perchloride of mercury treatment. If the first cyst had been quickly cured by simple tapping, or by an injection, it would have been easily said, and believed too, that the second cyst was really only the first refilled. How often does one find at a *post-mortem* examination, where there is one cyst, that there are others present. To my mind, then, the evidence, so far, has not been sufficient, in most of the cases recorded, to prove that the original cyst, which has been collapsed for years, has refilled, but is more in favour of a new cyst forming.

The risks attending this treatment are, I consider, less than—in so much that the danger of suddenly evacuating a large collection of fluid in the internal parts of the body is avoided—though similar to, those of simple tapping, with complete evacuation of contents. To guard against the susceptibility that some patients have to mercury, it might be advisable to administer by the mouth a few doses of the perchloride a few days prior to injecting it, and carefully watch its effects. As to what size dose can be injected with safety, I think gr. $\frac{1}{2}$ would not be too much for a strong adult. In my second case, a girl of eight years to gr. $\frac{1}{8}$, which was not followed by any symptoms that could be attributed to the mercury. Reaction certainly followed in every case, more or less, and generally immediately after the tapping, but I believe this was due to the mere puncture of the cyst.

It may be said, in these few cases, that the successful result was brought about by the mere puncture of the cyst, and that the injection of the perchloride of mercury had nothing to do with it. If it really be so, I think I must congratulate myself on having apparently cured three consecutive cases by so simple a procedure.

Personally, I certainly hold with those who believe “that simple or aspiratory tapping is curative in a large proportion of cases;” and in bringing forward this treatment of injecting the perchloride of mercury, I do so to suggest an improvement, if I may use the expression, upon that procedure, in that I believe it will give a larger percentage of cures.

Treatment of Echinococcus by Injection of Strong Solution of Perchloride of Mercury.

J. TREMEARNE, M.R.C.S., Eng.

DURING the last twenty years I have had a large number of patients infected with echinococcus. Unfortunately, only about one-third of these cases are accessible to surgical treatment, but when the parasite could be got at, one of the following methods has been adopted:—1st, simple aspiration; 2nd, cutting down to and dissecting out the cyst; 3rd, setting up suppuration and drainage; 4th, injection following aspiration. Of these, the one that has proved most successful has been the injection of a strong solution of perchloride of mercury from two to six grains to the ounce.

Since commencing this method in 1886 very favourable results have been obtained; a fine trocar, with a syringe to fit the cannula, or the ordinary aspirator, with two taps, so that the current can be reversed, may be used. After removing such portion of the fluid as will easily escape through the cannula, from a drachm to two ounces of the solution of the perchloride, according to the size of the cyst, is injected; this solution may remain from fifteen to thirty minutes before it is allowed to escape. The cyst is then freely washed out with warm water, containing about half a grain to the ounce of the perchloride (a little of which may be allowed to remain in) and the syringe withdrawn. As a rule, but little, if any, febrile disturbance is set up, but the patient is kept in bed for a week before allowed to return home. Where the cyst contained less than a pint of clear echinococcus fluid, suppuration has not taken place as a result of the operation. Other solutions, such as permanganate of potash, iodine, &c., and even a weak one of the perchloride, were formerly used, but with apparently no better effect than ordinary aspiration.

It appears as if the strong solution of mercury not only destroys the daughter vesicles, but helps the degeneration and shrivelling of the sac. The plan seems to answer whenever the trocar can reach a cyst containing clear fluid (which need not be quite emptied of its contents before introducing the mercury solution). When pus or semi-purulent matter is present, and it is desired to cause the sac to suppurate out, the mercury appears to hasten the process considerably.

Miss Cunningham, a tall, big woman, had no less than eleven pints of fluid removed from an enormous cyst on the liver in 1886; the perchloride was used in the usual manner, and she left my private hospital at the end of a week. Her health kept good, and she was able to do all the hard work of a farmer's wife for nearly three years, when a severe attack of influenza, accompanied by pneumonia on the left side, brought her again under treatment. In three weeks, when nearly convalescent, the right lung was suddenly attacked, and eventually the old cyst, acting as a foreign body,

set up suppuration, so that her side had to be freely opened to allow the escape of pus. Within two days the sac was discharged entire, but withered to such a degree that the whole mass did not weigh quite two ounces.

Miss Ida W. suffered greatly from the presence of a deep-seated tumour in the neck and upper portion of the left lung. An unsuccessful attempt had been made by a surgeon two months before to reach the tumour. After cutting to the depth of an inch into the neck, a sharp pointed probe was pushed forward, followed by a director, when clear hydatid fluid welled up. Over ten ounces were removed, the cyst injected with the six-grain solution and washed out; a stout tube was inserted into the wound, through which a weak solution of mercury could be injected daily. The entire sac came away on the seventh day. A sister of this patient had four pints of fluid removed from a cyst in the liver, and the usual treatment adopted with perfect success. Ptyalism never resulted, although as much as twelve grains of the perchloride in two ounces of water has been sometimes used.

The report of the cases treated (from 1886 to 1890) cover a period of about five years. Nearly two years have elapsed since the last one mentioned in the list, so that a little time has been given to judge of the effect of the treatment.

All that has come to my knowledge up to the present time concerning the cases has been stated, but it is quite possible that the disease may have returned, or death occurred in some instances, without my having been informed.

(Tables of the cases referred to in this paper will be found on pages 400 to 403.)

List of Cases treated by Injection of Perchloride of Mercury during the Five Years 1886-1890. (*Dr. Tremearne.*)

Age.	Sex.	Seat of disease.	Quantity of fluid withdrawn.	Condition after operation.	Result.	Remarks.
15	F.	Lung	3 pints	Pneumonia came on within three days	Cured	The old cyst was coughed up in pieces. Seen three years after. Lung contracted and adherent to side; otherwise enjoys fair health.
42	F.	Liver	24 ounces	Very little febrile disturbance	"	Seen a year after.
19	F.	"	4 pints	Febrile condition for a month	"	Was quite well three years after, when seen.
7	F.	Neck	8 ounces	Slight feverishness	"	Cyst came away through wound left open.
25	F.	Lung	6 "	Very slight pyrexia	"	Seen six months after, then well.
70	F.	Abdomen	3 pints	No fever or discomfort	"	Quite well since.
12	F.	Lung	13 ounces	Slight febrile condition for a few days	"	Seen two years after (quite well).
24	M.	"	1½ drachm	No disturbance of system	"	Seen six months after.
5	M.	Base of skull	2 ounces	"	"	This patient was palsied and quite blind before operation. A week after could walk, but sight bad. Three months after seemed well, but not heard of since. The tumour projected in temporal region.
21	S.	Lung	½ "	No special symptom	"	Fluid purulent. Lungs became diseased, and a year after the case was hopeless.
27	M.	"	2 "	Considerable fever	No benefit	"
28	M.	"	2 "	No febrile disturbance	Cured	"
59	M.	Liver	29 "	Tenderness over liver for a month after	"	"
18	M.	"	16 "	Slight pyrexia for three or four days	"	"
40	M.	"	3 pints	Tenderness over liver for first few days	"	A month before, a cyst burst into bowels, when great amount of skins were discharged with the motions.
20	M.	Lung	1 drachm	No pain or fever	Seemed cured	Seen a year after operation.
27	M.	"	1 ounce	"	"	Seen eight months after operation.
19	M.	"	Less than a drachm	"	"	Seen two months after operation.
24	M.	"	26 ounces	"	"	Seen recently (in 1892).
23	M.	"	3 "	Slight febrile disturbance	"	Seen in 1892 (brother of the last one).
19	M.	"	1 pint	Very slight pyrexia	"	Had coughed up some skins, &c., some years before operation.
36	M.	"	2 ounces	"	"	(Seen two years after).
31	M.	"	2 drachms	"	"	"
37	F.	Liver	18 ounces	"	"	Still ailing from uterine disease.
23	F.	Uterus	1½ "	"	"	Large amount of skins, &c., discharged through bowels, a week after.
22	F.	Liver	2 "	No disturbance of system	"	Seen recently (perfectly well).
12	M.	Liver	2 pints	Slight pyrexia and pain over seat of disease for 4 days.	"	The matter removed was purulent. She had a slight attack of pneumonia, but was convalescent after ten days. Was relieved for a time, but died four years after from exhaustion.
30	F.	Lungs	3 ounces	Pneumonia 3 days after	"	"
60	M.	Liver	1 "	No febrile symptoms	"	Appeared to be well, but two years after was ailing with jaundice.

List of Cases treated by Injection of Perchloride of Mercury during the Five Years 1886-1890.—*continued.*

Age.	Sex.	Seat of disease.	Quantity of fluid withdrawn.	Condition after operation.	Result.	Remarks.
6	M.	Liver.....	3 drachms.....	Severe feverish condition for a week.....	Cured.....	Seen five years after.
42	M.	Lumbar region.....	3 ounces.....	No disturbance of system.....	".....	Seen five years after.
24	M.	Liver.....	6 ".....	".....	".....	
30	M.	Lung.....	4 ".....	Slight febrile symptoms.....	".....	Treated for liver first; afterwards several separate cysts in the abdomen were operated on.
30	M.	Liver and abdomen.....	2 pints.....	".....	".....	Well in 1892.
27	M.	Lung.....	1 drachm.....	No disturbance of system.....	".....	Well in 1892. Had vomited cysts, &c., a year before operation.
25	M.	Testicle.....	3 ".....	".....	".....	Influenza, followed by pneumonia, caused the old cyst to act as a foreign body and suppurate out three years after.
51	F.	Liver.....	1 pint.....	High temperature first five days.....	".....	Seen in 1891; troubled with palpitation and deb. Heart had been displaced by the enormous tumour.
39	M.	".....	11 ".....	Slight pyrexia four days.....	".....	Seen two years after.
23	M.	Liver and arm.....	4 ounces and 1½ ounces.....	No disturbance of system.....	".....	Cyst suppurated out on the eighth day.
32	M.	Tibia.....	1 ounce.....	Slight pyrexia.....	".....	Seen two years after.
39	M.	Liver.....	2 ounces.....	No febrile disturbance.....	".....	Seen five years after.
27	F.	".....	14 ".....	Very slight pyrexia.....	".....	Seen three years after.
57	F.	Abdomen.....	2 pints.....	".....	".....	Cyst came away.
23	F.	Uterus.....	2 ounces.....	Fever for a week.....	".....	Fluid semi-purulent when aspirated, larger tube inserted, and after infection with perchloride retained in wound.
32	F.	Liver.....	6 pints.....	Suppurative fever, in bed three weeks.....	".....	Coughed up skins six months previously (from the other lung).
26	M.	Lung.....	2 ounces.....	No disturbance of system.....	".....	Seen a year after.
24	M.	".....	½ ounce.....	".....	".....	
60	F.	Liver.....	10 pints.....	Fever and high temperature.....	".....	The fluid was purulent, so laid open cyst and put in drainage tube. Everything came away by suppuration, and wound healed.
22	M.	Lung.....	1½ ounces.....	Slight pyrexia.....	".....	Well a year after.
22	M.	".....	1 ounce.....	No disturbance of system.....	".....	Coughed up large amount of skins shortly after.
49	F.	Spleen.....	3 ounces.....	".....	".....	Well six months after.
26	F.	Liver.....	1½ ".....	".....	".....	
23	F.	".....	4 pints.....	Pyrexia for eight days.....	".....	
59	F.	Abdomen.....	4 ounces.....	No disturbance of system.....	".....	Two cysts (separate) were treated in abdomen, and another from vagina, and 2 oz. of fluid removed.

LIST of cases treated by Injection of Perchloride of Mercury during the five years (1886-1890) in which Aspiration alone had previously failed. (*Dr. Tremearne.*)

Age.	Sex.	Seat of disease.	*Previous No. of tappings.	Quantity of fluid withdrawn at time of injection.	Condition after injection.	Result.	Remarks.
21	M.	Liver ..	3	2 ounces	Slight pyrexia	Cured .....	... ..
30	F.	" ..	1	20 "	Sharp pain and fever for a week	" .....	... ..
50	F.	" ..	1	Over a pint of very purulent matter.	Fever and jaundice .....	.....	Died two years after.
54	F.	" ..	1	8 ounces	Slight fever	Cured	Seen four years after, and well.
38	M.	Abdomen	1	4 "	No febrile disturbance	"	Seen five years after, well.
24	M.	Lung ..	1	1½ "	" ..	"	Seen after, quite well.
51	F.	" ..	1	15 " purulent matter	Pneumonia	"	Was quite well in two months, and remains so to this time.
30	* M.	" ..	2	2 pints	Very slight pyrexia .....	" .....	.....
22	M.	Liver ..	1	4 " .....	" ..	" .....	.....
23	M.	Lung ..	1	3 ounces	No febrile disturbance .....	" .....	.....
26	M.	Tibia ..	1	1 ounce .....	" ..	.....	Had extensive disease of tibia when operated on. Small cysts, from the size of a pin's head to a pea, frequently came through wound in leg. He seemed cured, and wound healed, but opened again three years after, and cysts again discharged.

* The previous tappings performed by other medical men in all these cases.

RESULT of Cases of Echinococcus treated by Strong Injection of Perchloride of Mercury (two to six grains to the ounce) into Cyst, for five years, 1886-1890. (*Dr. Tremearne.*)

(Treated at the Private Hospital, Creswick, Victoria.)

	Cured.	Not benefited.	Died.	Total.
Total number of patients treated by injection, not previously aspirated.	51	2	1	54
Total number of cases on whom aspiration had previously been performed.	9	1	1	11
Totals	60	3	2	65

NOTE.—Of the two deaths, one took place two years, and the other four years, after the operation.

Hydatid Disease.—Some Remarks on Operative Measures with a short Record of Fatal Cases.

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THE operative treatment of hydatid disease was so fully diseussed at the last meeting of Congress in Melbourne, and has received such marked attention since—both here and at home—that any full description of mere methods of operating is quite unnecessary.

With your permission, I shall submit some observations, based upon a consecutive series of twenty-five operations I have performed at the Adelaide Hospital and in private practice. In twenty-one instances the patients have made good recoveries and gone away well, but four have died after operation, and their cases I propose to put on record.

It will be seen that they were none of them favourable for operation, but less radical means offered no prospect of relief. I do not recollect having rejected any case as unsuitable for operation. Fifteen cases of hepatic cyst were attacked by anterior abdominal incision. In one only was an immediate counter incision made. In two, counter incisions were required to facilitate the closure of the cavity. The only fatal case presented thrombosis of the vena cava. Four cases were treated by incision through the pleura and diaphragm after rib resection. Hydatids were removed, after excision of rib, from the left lung, in two patients who had previously undergone abdominal section for cysts in the right lobe of the liver.

Many of the hepatic cases had been aspirated shortly before without other appreciable result than localised peritonitis and the formation of adhesions: one had been evacuated by the needle a month, another six months, a third four years previously. I have no notes of the few cases which were treated by aspiration alone. It has, unfortunately, been abundantly shown that puncture of the sac is no trivial operation, and that death may follow from shock, and, in the case of lung, from asphyxia. Apart from this risk there is the very frequent leakage which follows the withdrawal of the cannula, a leakage which, in the case of the abdomen, may set up general peritonitis. Even as a diagnostic aid aspiration is no absolute guide, and in many cases the tumour should not be punctured except under an anæsthetic, with every preparation for immediate section. In the majority of cases it is best to expose the tumour before puncturing it at all. After exposing the sac, or the serous covering of the organ containing it, I pass in two large curved needles about half an inch apart, each needle traversing the tissues on either side of the incision (leaving out the skin) and entering the cyst deeply so as to get a good hold of the sac or affected organ. The needles withdrawn, leave two stout kangaroo tendons which, held up by an assistant, steady the sac, or the parts containing it, during incision, and prevent any escape of fluids into the thorax or abdomen whilst the edges of the incision in the sac are being sutured permanently to the superficial parietes by a quickly inserted kangaroo tendon suture.

I do not include the skin in the suturing, and much prefer tendon to silk. The absorbable suture lasting a week or ten days gives no further trouble, while silk or wire sutures are sometimes overlooked, and have to be removed from the walls of a sinus, which they have prevented healing probably for many months. The immediate removal of the parasite by copious irrigation and the careful use of bullet forceps seem to me most necessary and desirable, and when the patient's condition does not forbid, half an hour is well spent in removing the whole parent and all the daughter cysts.

I have seldom made a counter opening for more efficient drainage, but always insert a very large tube, and, in the case of large sacs, two large tubes. In the after treatment, where the sac has been thoroughly emptied, I do not always irrigate until suppuration is commencing, but then wash out carefully three or four times daily, and in a few hepatic cases have, in delayed healing, made a counter opening so as to get thorough drainage.

Fatal cases of Hydatid Disease after Abdominal Section.

Case 1. Hydatid of the spleen.—M. W. French, *æt.* 17, residence Strathalbyn, S. A. Has complained of pain in the left side for six weeks, with dyspnœa and palpitation. There is a large tumour occupying the left hypochondrium and epigastrium. The ribs are everted; there is tenderness on pressure; the tumour is most protuberant a little to the left of the middle line; the apex beat is in the third intercostal space, about $1\frac{1}{2}$ inch from the sternum. There is no albuminuria. June 2nd, 1889.—Under ether, an incision was made vertically over the most prominent part of the tumour, which was found firmly adherent to the parietes. A free incision gave exit to a large number of broken down cysts, and purulent fluid. The cavity was irrigated with boracic lotion, and the wound dressed with iodoform and carbolised gauze. Large drain tubes were used. Vomiting set in soon after the operation, and continued almost daily until the end. Cystitis set in early in July, and the urine soon became, and continued more or less, purulent. The patient, at first emaciated and anæmic, developed anasarca of the legs in August, dying on the eighty-second day. Iodoform and corrosive sublimate were discarded early on account of the vomiting, but no relief attended their disuse. A deep sinus persisted, and did not heal. The *post-mortem* showed wide destruction of the spleen, and peritonitic adhesions between the left lobe of the liver and the spleen. The liver was normal; the kidneys were pale with adherent capsules.

Here there was a very large suppurating cyst with only six weeks history of illness. The firm adhesions to the parietes would probably have allowed the contents to escape externally had no operation been performed.

Case 2.—F. G., *æt.* 66 years, shepherd, resident in the Colony forty-two years. Admitted on April 15th, 1892. He complained of a lump in his left hypochondrium, which he first noticed three years ago. It has been steadily growing and sometimes causing slight pain; has never suffered from ague; previous history good. Here there was a marked projection in the left epigastric and hypochondriac regions. A smooth rounded tumour could be felt, its inner margin extending inwards to the mid line, its lower border reaching 3 inches below the costal margin. It moved with respiration; no thrill was obtainable; there were a few rhonchi at the bases; the urine was normal; hydatid fluid was demonstrated by the hypodermic needle. Two days afterwards a vertical incision was made over the most prominent part of the tumour, the peritoneum being opened and the cyst exposed. Recent adhesions of parietal and visceral peritoneum were found. Two deep sutures

were passed through the abdominal walls and the sac. A free incision evacuated an enormous number of cysts with very little fluid. There was profuse hæmorrhage from the sac walls, which were closely approximated to the parietes by interrupted sutures. Two large sized drainage tubes were inserted. There was further hæmorrhage from the sac walls, great collapse, retention of urine, and death on the third day. *Post-mortem*.—The intestines were distended, and there was evidence of recent peritonitis; the abdominal parietes around the incision were discoloured with blood; the coronary arteries were atheromatous; the endocardium was thickened and opaque; the left lung was adherent to the diaphragm; the cyst involved the spleen and was adherent to the fundus of the stomach.

This old man was wiry and hardy, and did not look much more than 50 years of age. The cyst was very large. He never properly recovered from the shock of the operation and the hæmorrhage which occurred on the second day. The atheroma of his coronary arteries and the extensive pleural adhesions made him a peculiarly bad subject for operation, and the occurrence of peritonitis, although there was no evidence of leakage, accelerated his death.

Hydatid of Liver.—Thrombosis of Vena Cava.

Case 3.—Mrs. D., *æt.* 39, married, cook, Renmark, S.A. Admitted March 13th, 1891, under the care of Dr. Lendon, to whom I am indebted for the early notes of the case. Illness began eight months ago, with severe attacks of pain in the right hypochondrium. She was laid up for several days, seven and five months ago, with severe hepatic pain. Her legs have been swollen for five, her abdomen for two, weeks. Previous health fairly good; but has long been subject to "bilious attacks." On admission, the temperature is 100°. There is marked ascites and anasarca, and a large and irregular shaped tumour in the right hypochondriac and epigastric regions. Many pints of ascitic fluid were removed by Southey's tube, and at the end of April hydatid fluid, containing scolices, was got by aspiration in the epigastrium. Transferred to my ward on May 5th. The urine was found to be acid, and free from albumen. Seven pints of ascitic fluid being withdrawn by aspiration, a large tumour could be plainly felt continuous with the liver, and chiefly on the left side. Under ether I operated in the usual manner, incising the parietes slightly to the left of the mid-line. After allowing about 2 gallons of ascitic fluid to run off, the liver was sutured to the edges of the parietal incision, the cyst laid open, and the parasite partly removed. I did not remove the whole of the very friable cyst wall on account of the patient's collapsed condition. There was very considerable hæmorrhage from the liver. She lived seven days.

Professor Watson's *post-mortem* notes show that there was obstruction of the vena cava from pressure of the hydatid cyst, and slight adhesions of the intima, and consecutive thrombosis of the cava below the hepatic veins and of the right common iliac. The sac occupied the greater part of the right lobe and the lobus spigelii, and contained a few fragments of hydatid cysts. The kidneys gave evidence of commencing interstitial nephritis, and one of them contained a small infarct. There was no pulmonary embolism.

Hydatid of Kidney.

Case 4.—S. M., *æt.* 66, bootmaker, residing in Adelaide, 38 years in the colony. Admitted April 8th, 1892, under the care of Dr. Lendon, who notes that he was in the hospital four months ago for rheumatic pains in the left ankle, when he said he had been subject to rheumatic attacks for fifteen

years. He had then a large rounded movable tumour just below the right costal margin, and there was a small quantity of albumen in the urine. He complains of pain in the right side of the abdomen; and is often faint and giddy. Albumen half gramme per litre. There is a large hard tumour in the right lumbar region; it does not fluctuate; gives no thrill on percussion, and moves with respiration. The edge of the liver can be felt above the tumour. April 18th, 1892, aspirated; needle seemed to enter a solid mass; no fluid obtained. Aspirated again on May 3rd with negative results. Dr. London transferred him to my ward, and it was decided in consultation to cut down upon the tumour and explore it. This was done on May 19th. A vertical incision was made in the right hypochondrium over the most prominent part of the tumour; the intestines were pushed aside with flat sponges, and the tumour exposed. A fine cannula drew off a little foul-smelling fluid. The lower surface of the liver was seen, and felt to be quite separate from the cyst. A sponge was placed over the cannula puncture, and as it was impossible to bring the cyst up to the abdominal wall, another incision was made in the right loin behind the ascending colon, the cyst opened and sutured to the parietes. A quantity of foul fluid and many decomposing cysts were evacuated by irrigation with boracic solution. Two large drainage tubes were inserted. On the fourth day, fæces were found in the dressings, but the patient had a full, strong, regular pulse, and his temperature was sub-normal. From this time until the day of his death, twenty-six days after the operation, there was no persistent rise of temperature. It was generally normal or sub-normal. During the second week he became delirious, and continued so to the end. There was never any copious evacuation of fæces through the wound, but the discharges were fæculent and profuse. *Post-mortem*.—There were adhesions of omentum to the cicatrix of the anterior wound; there was no evidence of general peritonitis; there was good firm union of the sac walls to the lateral opening in the parietes; there was an old adhesion existing between the ascending colon and the sac, and a small perforation through which the fæces escaped into the sac; the right kidney had been almost entirely absorbed; its remaining cortex and capsule forming a large sac. The left kidney was much enlarged—weighed 12 oz.—and showed evidence of commencing interstitial nephritis. The liver was normal, as was the heart.

Here the presence of albumen in the urine did not seem to forbid the evacuation of an hydatid cyst of the kidney, but the sapræmic condition which supervened on the escape of the fæces into the large sac, was too grave to allow of the subsequent removal of the kidney remains, and the suturing of the colon to the parietes. In a younger subject it might have been attempted. There was evidence of fæcal contamination of the cyst contents at the time of operation, but none of absolute perforation.

A Contribution to the Study of the Surgical Treatment of Hydatid Disease.

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No subject of discussion at the second session of the Intercolonial Medical Congress excited more general interest than that on the surgical treatment of hydatid disease. Representatives of the profession from all the Australasian Colonies took part in it, of whom many possessed a long and large experience of a disease for the prevalence of which Australasia enjoys an unenviable notoriety. It was perhaps too much to expect, or even to hope, that there should be an entire consensus of opinion on the question of treatment, to which by agreement the discussion was limited, but the next best result happened; for the expressed opinion of those who contributed to the debate made it abundantly clear that the proper method of treatment was to be sought between the alternatives of aspiration or complete and immediate removal of the parasite by incision, with certain precautions, after the method commonly known as that of Lindemann. Some, however, declared a preference for ordinary tapping with a fine trocar. As a matter of secondary importance, though of some interest to the history of Australian surgery, it further became evident that the representatives of South Australia appeared, without exception, as the strong advocates of the more radical operation, while on the other side were ranged the majority of the practitioners from the other colonies.

Thus the question was left at the close of the last Congress, with the enunciation of these broadly marked divergent views, to the practical exclusion of all other methods of treatment that have been at various times put into practice. It will, I understand, be a special object of this meeting to reach a still more definite conclusion, which practically means the acceptance of one or other of the above alternatives.

As a contribution towards the solution of this question, so full of importance to Australian surgeons, I submit to the attention of Congress the results embodied in a table of 80 cases of hydatids, drawn from the practice of the Adelaide Hospital, during a period of four and a half years from 1st January, 1888, to 30th June, 1892, to which I will presently refer more particularly.

That aspiration or ordinary tapping *may* frequently result in a complete and permanent cure, is within the experience of all surgeons who have had many dealings with hydatid disease, and the points really at issue resolve themselves into two, which may be thus stated:—

- (1) Is the easy, simple, and apparently safe procedure of aspiration, or of ordinary tapping, attended with real risk to life, or, at least, with less risk than the more radical and apparently more dangerous method of incision?
- (2) In what proportion of cases are the cures resulting from the former class of operation actual and permanent?

Upon the answers to these questions our conclusions should depend, and the answers in their turn await a correct appreciation of the facts. It is the special object of this paper to contribute to the latter, and to suggest an interpretation based upon these, as well as upon previously recorded facts. That the apparently trivial operation of puncture, aspiratory or otherwise, is not unattended with considerable risk, has already been shown very conclusively by the statistics of Dr. Thomas, published in the *Australian Medical Journal* for 1888. His figures (and in this aspect of the case I must very largely rely on these) show a mortality of 11.11 per cent. after single aspiratory punctures, and of 15.8 per cent. after repeated aspiratory punctures; while, after ordinary tapplings, these figures rise respectively to 22.30 and 31 per cent. Dr. Gardner, in his paper on the surgical treatment of hydatid disease, also read before the last session of Congress, records seven cases of death following aspiration and presumably in consequence of it; and it is, I think, a fact that most surgeons, who have had much experience of hydatid disease, have had under their notice cases in which some form of puncture has caused either a fatal result, or symptoms so sudden and severe as to amount to complete collapse.

An instructive illustration of the latter condition occurred in one of my own cases (Nos. 65 and 66, Table I). The patient was affected with multiple hydatids, involving the apex of the right lung, the liver and right kidney. I had successfully completed a radical operation on the last-named organ, and the patient's condition had remained excellent throughout. Before the recovery of the child from the effects of the anæsthetic, I determined to try the effect of aspiration upon the cyst in the liver. The withdrawal of a comparatively small amount of limpid fluid was immediately followed by the most severe collapse, from which the little patient was with difficulty aroused. Here, then, is an instance of abdominal section and aspiration in the same subject on the same occasion, in which the contrast between the excellent condition of the patient after the radical operation, and the severity of the collapse after the apparently more trivial puncture, was very remarkable. It is very difficult to account for these results, which have not unfrequently been observed; the suggestion that the symptoms are due to the mechanical effects of the withdrawal of the fluid leaves unexplained the fact that it is unusual to observe similar results after the much more sudden emptying by incision. The presence and escape of a poisonous ptomaine, which is stated to exist in the fluid, may be a tempting suggestion; though, considering the rapidity of the onset of the symptoms, it is more probable that the nervous system is primarily involved in some reflex actions.

Having regard then to such facts and figures as the foregoing, and without insisting on the absolute value of the latter, I take it as at least proved that we must not regard either ordinary, or aspiratory, puncture of hydatids as a trivial or necessarily safe procedure. Whatever uncertainty there may be in the determination of the number of cases which are, or are not, permanently cured by either of these methods, the number of deaths which have occurred, and the severity of the symptoms which have been observed to follow puncture, whether by aspiration or in the ordinary way, are startling objective facts which must be reckoned with. We can no longer use the *prima facie* argument that puncture, from the ease and simplicity of the proceeding, is necessarily safe. Apart from the highly important question of the permanence of the cure, puncture of hydatids must be distinctly looked upon as a serious operation, carrying with it, like other operations, no inconsiderable direct risks to life. And, if Dr. Thomas's

figures may be relied on, that risk is materially greater in ordinary tapping than in aspiration—a view with which I entirely coincide. Seeing that direct incision is, and has been for some time, the general practice at the Adelaide Hospital—aspiratory puncture being used merely for the verification of a diagnosis or as a guide to location at the time of operation,—statistics drawn from that institution can contribute little bearing upon the point that has just been discussed; but with regard to an estimate of the value of the alternate proceeding, I think the appended table, showing its results in our hands, contains a sufficient number and variety of cases to permit certain definite conclusions to be drawn, especially when they are read in conjunction with the results of other practitioners who have adopted similar methods.

The table in question contains, as already stated, a total number of eighty cases, drawn exclusively from the practice of the Adelaide Hospital, and comprising *all* cases of hydatids which have been treated surgically during the four and a half years ending June 30th, 1892. For the purposes of this paper I exclude from consideration three cases, where it was not necessary to interfere with the great cavities of the body, and one case of apparently successful aspiration, leaving, therefore, seventy-six cases for examination and analysis. It might have been possible to add considerably to this number by the inclusion of operations performed in private by the surgical staff of the hospital, but I have preferred to deal separately and particularly with this group, inasmuch as, having been treated in one and the same institution by a hospital staff who have uniformly adopted one method of operation and practically one manner of performing it, it represents as homogeneous a group as it is possible to bring together. It may be added that this uniformity of treatment included as rigid an adherence to antiseptic methods as the circumstances of the case permitted, and in all instances, but one, ether was the anæsthetic used. In that cocaine was employed with apparently complete success so far as the anæsthesia was concerned. I was myself able to witness the great majority of the operations and to follow their course. In one respect, particularly, I claim significance and value for this table, as well as for a smaller table kindly supplied to me by my friend and late colleague, Dr. Gardner. Being all Australian cases, the surgical results, whatever these may be, can be taken as fairly representative of the practice of those of our surgeons who have definitely given their adhesion to the radical operation, and who, between them, have now a considerable experience of its performance. In this respect it has an advantage over the tables of Dr. Thomas, whose cases are largely taken from foreign sources. I make this observation as I have more than once seen comment expressed in the English medical papers upon the fact that the results hitherto published by colonial surgeons reflect the practice of Europe rather than that of Australia. And, even if it be not possible that the discussions of this Congress should lead to a consensus of Australian opinion on the points at issue, it will be at least desirable that the facts which have influenced our individual opinions should go forth to the world under the authority of this Congress. The question is obviously one in which the unreliable and fallacious guide of mere impressions should not serve as a basis of argument.

But although, for the reason stated, I attach importance to these lists, I shall, for purposes of comparison, freely use and frequently refer,—(1) to the careful tables of Dr. Thomas, after deduction of a few cases which appear in my own list; (2) to the table also published by Dr. Gardner in the transactions of the last session of Congress, also subject to certain

deductions for cases that appear either in Dr. Thomas's tables or my own; and (3) to a small list embodying Dr. Gardner's recent private practice from April, 1889, to February, 1891, which, not having been previously published, is now given in detail as a separate table. The first two of these tables having already been published naturally invite reference for purposes of comparison, and if the last is here introduced where other lists from private sources are not also included, it is because Dr. Gardner has not only been, until quite recently, one of the staff of the Adelaide Hospital, but his experience has been so large and his influence so considerable upon the practice of South Australia that any treatment of the subject would be incomplete without reference to his work in this field. In analysing the results I shall include all Dr. Gardner's cases, not appearing in Dr. Thomas's list or in my own, under one set of figures, which will be referred to as Dr. Gardner's cases. (Table IV.)

The Adelaide Hospital cases.—Tables I, II, and III.

A reference to the details will show that the list includes a large proportion of cases of grave character, either from the position of the tumour or on account of the urgency of the symptoms which had supervened before advice was sought. The essential particulars as to site and result of treatment will be conveniently seen in the summary of the cases (Table II), while other details will be found in Table I. An analysis of this summary gives for the 76 cases, to which attention is invited, 14 deaths, or a mortality of 18·4 per cent. Or, if the operation is divided into three classes in which an incision was made into abdomen only, thorax only, or in which both abdomen and thorax were opened, as in the case of cysts of the upper surface of the liver, inaccessible by ordinary abdominal section, we get the results shown in the following table:—

Nature of Operation.	No. of Cases.	No. of Cures.	No. of Deaths.	Per Centum of Deaths.
Abdominal sections	48	39	9	18·7
Thoracic sections	15	14	1	6·6
Thoracico-abdominal sections.....	13	9	4	30·7
Total	76	62	14	18·4

In presenting these figures, however, as an estimate of the mortality results, it is not only fair, but proper, to call attention to the fact that, of this total of 14 deaths, 9 were not properly attributable to the operation. Two were moribund from septicæmia on admission and three others had distinct symptoms of septic infection; two had suppurative peritonitis at the time of operation—one from the bursting of an unsuspected pyo-salpinx, and the other from the antecedent rupture of a hydatid into the peritoneal cavity; one died of chronic interstitial nephritis; and another from thrombosis of the inferior vena cava induced by the pressure of the cyst, the patient being enormously ascitic and very low on admission.

In all these cases it is, to say the least of it, in the highest degree improbable that any other treatment, or the absence of treatment, would have altered the result, or that the operation materially affected it. If, then, it were right to manipulate these figures by the deduction of these cases, we should have five only in which the fatal result was directly attributable to the operation, or a mortality percentage of only 6·5. Table III shows the causes of death in all instances.

A reference to the summary (Table II) brings out the favourable results of uncomplicated thoracic section (6·6 per cent. of deaths) in comparison with the relatively high mortality of hydatids of the liver (30·7 per cent.) which, from their position, require to be reached by thoracic incision. This is not, perhaps, to be wondered at, considering that the operation involves the double risk of opening two large internal cavities, but in spite of this the comparatively low mortality after pulmonary and pleural hydatids, brings down the death-rate of all thoracic sections to 17·8, or a figure only slightly above that of the abdominal sections. The comparatively high mortality of these is partly accounted for by the fact that six out of the nine cases whose deaths were not directly attributable to the operation belong to that class.

Unusually large Hydatid.—There is one case (No. 63) in my list which deserves particular reference, for I believe it is the largest on record. The contents evacuated, taking fluid and daughter cysts together, measured 20 pints, and an estimate of the number of the latter based upon an actual enumeration of those contained in half a pint, counting only those which were as large, or larger, than a grain of pearl barley, give the enormous total of nearly 28·000. The size ranged up to that of a small orange, and besides those actually reckoned there must have been thousands which escaped enumeration from their exceedingly small size. This cyst also contained a solid mass of almost pure crystalline bilirubin, weighing 1·13 grammes, and many of the daughter cysts were stained to a bright orange-red with the same material. This case has been more fully reported by my friend and former house surgeon, Dr. R. H. Jones, in the proceedings of the South Australian branch of the British Medical Association, and the report of it appears in the *Australasian Medical Gazette* for November, 1891.

Multiple Hydatids.—Ten cases were the subjects of more than one hydatid cyst, and in the course of treatment underwent more than one operation. The essential particulars are indicated in the following table. It is a remarkable result that every one of these patients recovered from their severe ordeal, and are believed to be alive and well at the present moment.

TABLE showing cases of Multiple Hydatids:—

No. of Case in Table I.	Position of Parasite.	Nature of Operation.	Date.	Result.
I {	Lung, left	Thoracic section	December, 1886.	Cure.
	Liver	Aspiration	August, 1887.	
	Lung, left	Thoracic section	December, 1887.	
	Liver	Thor. abd. section	January, 1888.	
	Lung	" section	April, 1888.	
43 {	" left	" "	January, 1890	
II {	Liver, right lobe ...	Abdominal section	January, 1888.	Cure.
	" left lobe	" "	July, 1890	
III {	Pleura, right	Thoracic section	December, 1887.	Cure.
	Liver, right lobe ...	Re-opened twice	June & July, 1888	
	Pectoralis major ...	Thor. abd. section ..	March, 1888.	
	Lung, right	Excision	October, 1888	
	Pleura, right	Thoracic section	November, 1888.	
33 {	" "	" "	September, 1889.	

TABLE showing cases of Multiplo Hydatids—*continued*.

No. of Case in Table 1.	Position of Parasite.	Nature of Operation.	Date.	Result.
IV { 6 7	Liver, left lobe " right lobe ... Psoas, right	Abdominal section Thor. abd. " Abdominal "	December, 1887. March, 1888. "	Cure.
V { 50	Lung, right "	Thoracic section " "	1887. July, 1890.....	Cure.
VI { 51 53	Liver, right lobe ... Lung, left	Abdominal section Thoracic section	August, 1890. September, 1890 ...	Cure.
VII { 58 62	Liver..... "	Abdominal section " "	February, 1891. May, 1891.....	Cure.
VIII { 65 66	Kidney, right Liver, left lobe..... " " Lung, right	Abdominal section Aspiration Abdominal section Spontaneous cure	July, 1891. " August, 1891.	Cure.
IX. { 69 70	Liver, right lobe ... Lung, left	Thor. abd. section..... " section	September, 1891 ... October, 1891.	Cure.
X { 76	Liver..... " right lobe ...	Abdominal section Thor. abd. "	1882. March, 1892.....	Cure.

From this it will be seen that one patient was submitted to no less than six operations, including four thoracic sections, one thoracico-abdominal section, and one aspiration. Another underwent five, including four thoracic sections, one thoracico-abdominal section, and one excision of an extra-visceral hydatid, without counting two re-openings of an old incompletely healed incision.

In *Case No. 65* the cysts of the liver and kidney were radically treated with success, a single aspiratory puncture of the former having been, as stated, unsuccessful. The parasite in the lung underwent spontaneous cure, by expectoration, after having been admitted to the hospital for the purpose of its removal. What ought to be the practice in such cases? We have now no hesitation in cutting down upon an unbroken hydatid of the lung where its presence and accessibility have been demonstrated;—indeed we hold this to be a safer proceeding than aspiration, or than the policy of delay,—as witness the exceptionally favourable results of uncomplicated thoracic section. But, assuming expectoration to have commenced, is it wiser to take the chance of a spontaneous cure, or to intervene by an operation? The primary risk of asphyxia from sudden flooding or blocking of the lungs, may be assumed to have passed by, but there still remains the subsequent risk of suffocation in the process of expectoration of the mother cyst, of fatal hæmoptysis, or of septic infection, in the course of long-continued suppuration, as has been pointed out by Dr. Thomas. On the

other hand, the difficulty of removal of collapsed and ruptured cysts, especially if small and deeply seated, is probably greater than in the case of those which, from being tense and full, are more easily located. It would be interesting to hear the result of the experience of members of Congress upon this point.

Absence of Mother Cyst.—Another point to which my attention has been called is, the occasional total absence of a mother cyst, or of any shreds or fragments which might be its remains. This happened in three cases in the table, one of them being the huge hydatid (No. 63) previously mentioned. In this, amongst the thousands of daughter cysts, no shred of tissue whatever was detected which could be assigned to this source. It is difficult to believe that so substantial a membrane, as it must have been, if ever it existed, could have been absorbed, macerated, or wholly dissolved; and yet this seems the only explanation, unless we suppose that the innumerable small cysts were the product of exogenous development.

Sex.—The whole unabridged table of 80 cases comprised 69 individuals, of whom 30 were males and 39 females, being in the proportion of 37·5 per cent. to 48·7 per cent., thus showing a preponderance of females, which is probably exceptional for Australasia.

Comparison with other Tables.—It will now be interesting to compare the results of the practice of the Adelaide Hospital with those recorded by other South Australian writers, and the comparison will be conveniently seen by reference to the following table, in which the classification previously adopted has been followed, and the necessary reductions made for all cases which have appeared in more than one list:—

TABLE showing comparative results of radical operations on Intra-abdominal and Intra-thoracic Hydatids.

	Recorded by—	No. of Cases.	Cures.	Deaths.	Mortality percentage.
A.—Abdominal Sections.....	Thomas (liver only)	65	58	7	10·8
	Stirling (all organs)	48	39	9	18·7
	Gardner (all organs)	23	19	4	17·4
	Totals	136	117	20	14·7
B.—Thoracic Sections	Thomas	40	35	5	12·5
	Stirling	15	14	1	6·6
	Gardner	8	7	1	12·5
	Totals	63	56	7	11·1
C.—Thoracico-abdominal Sections {	Thomas	25	14	11	44
	Stirling	13	9	4	30·7
	Gardner	5	5	...	0·0
	Totals	43	28	15	34·9
	Grand Totals	242	200	42	17·3

This table shows an aggregate of 242 cases, in which the abdomen, the thorax, or both abdomen and thorax were opened, with a death-rate of 17·3 per cent., which result approximates so closely to that of the practice of the Adelaide Hospital alone (18·4) as to suggest that the figures may be taken

as fairly representative. The favourable results of uncomplicated thoracic section still appear in the aggregate, though not to such a marked degree as in the previous table, which is possibly an exceptional return. Thoracico-abdominal section for hydatids of the liver still shows a high mortality, though Dr. Thomas's high rate has been, in the aggregate, considerably reduced by the more favorable returns of the recent Australian practice, and, considering the gravity of the cases, the result is encouraging. Uncomplicated abdominal sections show a mortality greater than I should have expected, but, as already stated, this is contributed to by a considerable proportion of cases in which, under any circumstances, a fatal result was practically unavoidable, and, if these were excluded, the result would appear much more favourable. It will be noted that Dr. Thomas's figures cover only hydatids of the liver, while those of Dr. Gardner and of the Adelaide Hospital include cysts of all abdominal organs affected.

If we may then consider the better procedure to lie between the alternatives of aspiration and the radical operation, the statistics here recorded give the following results:—Aspiration, having a mortality, according to Dr. Thomas, of 11·11 per cent. for single punctures, and 15·8 for repeated punctures, as against the radical operation with its death-rate of 17·3 per cent.; so that, if these figures may be taken as approximately representative, and considering the matter only in the light of the direct risk to life of some operative measure, without any qualification for cases in which the operation was not the direct cause of death, aspiration, even if repeated, would appear to be attended with distinctly less danger than the more radical operation; while, if the comparison is made between the latter and ordinary tapping (again using Dr. Thomas's figures previously stated to represent the risks of tapping), the radical operation has the distinct advantage.

There are, however, several very important considerations which largely minimise the apparent advantage of aspiration when the results are based solely on the death-rate, and these, in my opinion, completely shift the balance of advantage to the other side. The first of these is obviously the uncertainty of permanent cure after aspiratory puncture. Every writer on the subject has found himself confronted with the difficulties arising from ignorance of this incompletely determined factor, and it will be very satisfactory if the evidence sought by the Congress on this point should throw more light upon its value; in the meantime I shall be guided by Dr. Thomas's figures. In 411 cases of aspiration collected by him there were 170 total failures, or the large proportion of 41·4 per cent. As I have already stated, the prevailing practice in South Australia contra-indicates the accumulation of any large body of evidence on this head, but it is certain that at least eight out of the seventy-six cases recorded from the Adelaide Hospital were previously tapped unsuccessfully, and probably there were more. I am convinced that a thorough inquiry will always reveal a considerable percentage of failures of aspiration, and from the circumstances of the case I should suspect any ascertained numerical result to be under the truth.

Aspiration, then, gives us not only a certain percentage of deaths, by no means a *quantité négligeable*, but also a (probably) much larger percentage of complete failures to achieve its object, to say nothing of those cases in which the prospects of a subsequent radical operation are severely prejudiced by the advent of inflammation, suppuration or their consequences induced by the puncture. That the supervention of suppurative changes, carrying with it, as it does, the attendant possibility of septicæmic conditions, is a highly unfavourable accident, is a matter which need not be here insisted

upon. In seven out of my fourteen deaths, either suppuration or its consequences had taken place before operation, and though in none of these particular instances could these complications be attributed to a previous aspiration, yet the possibility of its occurrence must be ever present in our minds, and constitutes a genuine source of danger. That the danger is capable of being minimised with the careful precautions now generally used may be true, but it is also true that both the operating theatre and the *post mortem* room frequently reveal the fact that a simple puncture, however carefully performed, has been the starting point of unfavourable complications. In this category it is more than likely that we shall have, in future, to include, as a substantial risk, the possibility of the infection of the peritoneum by the escape of scolices and brood-capsules in consequence of the tapping of some abdominal organ. At least, this seems the most likely course of events in certain cases in which large areas of the peritoneal surface have been found thickly studded with living or degenerate echinococci. Such appearances have been observed at the Adelaide Hospital, and some striking instances are figured and described by Dr. Graham in his work on hydatid disease.

If, then, it is true that repeated aspirations often fail, single punctures will, *a fortiori*, fail still more frequently, and I think we may gain a clearer view of the result of this operation by expressing it arithmetically. Say that in a hundred cases of first aspiration there are x deaths and y failures; then the total number of operations that it will be necessary to perform

before all the patients are either killed or cured $= 100 + y + \frac{y^2}{100} + \dots$

$= 100 \left(\frac{1}{1 - \frac{y}{100}} \right) = \frac{10,000}{100 - y}$, and the total number of deaths $= \frac{100x}{100 - y}$, or con-

siderably more than the death-rate of single aspiratory punctures. So that it is clear that the death-rate of a first puncture, whatsoever that may be, does not truly represent the true death bill of aspiration, which operation ought also to be made to bear the brunt of any fatal cases of the radical operation subsequently performed in consequence of unfavourable complications induced by aspiration.

Again, there will, I think, be some degree of agreement, even amongst the advocates of aspiration or tapping, that there are certain cases in which neither method is appropriate or at least not likely to be successful. Such are very large, or multilocular, cysts, and cysts in which, by degeneration or inspissation, the contents have largely lost their fluid character, or in which the daughter cysts form the greater part of its contents; such also are those in which the wall of the mother cyst itself is degenerated or much thickened. There will, I think, be absolute agreement that tapping is inadmissible where suppuration has set in, and as Dr. Thomas rightly says, section is obviously the only resource where hydatids of the lung or liver have ruptured into the pleural cavity. In fact, the cases in which aspiration is on *prima facie* grounds likely to be successful become reduced to moderately-sized simple cysts with walls not unduly thickened.

It is possible that, in the opinion of some, I may have unduly narrowed the range of application of aspiration or tapping, and I freely admit that even spontaneous cure may take place in cases here stated to be unfavourable for puncture, but still, even with restricted limitations, there remain certain cases, in many of which the nature of the cyst is quite undeterminable before

operation, where puncture in any form has little chance of success. This fact, however, does not minimize the risks to which, as an operation, we have seen it is subject.

To make a fair comparison between the direct risks of the two classes of operation, those cases in which puncture is obviously inappropriate and incision the only rational procedure ought to be excluded. If that were done, the radical operation would be freed from the heavy handicap of fatal results accruing from the inclusion of many grave and unfavourable cases, and the comparison would then lie between the mortality of puncture and incision respectively, in uncomplicated cases. In a comparison on such terms there is reason to believe that the statistics of the radical operation would be greatly improved, while the results of aspiration would not be so much affected inasmuch as these cases are not invariably tapped. Be that as it may, if we take at hazard a given number of instances of aspiration, and an equal number of radical operations, the latter category will certainly contain the larger quota of grave cases, and its results, therefore, cannot but be unfavourably prejudiced.

The unfavourable aspect of the comparatively high mortality of the thoraco-abdominal sections for hydatids of the upper surface of the liver disappears, to a considerable extent, on examination of the individual cases, and does not, in my opinion, contra-indicate the operation. My table shows thirteen such cases with four deaths; in one of those the contents of the cyst were purulent and foetid, and the patient already septicæmic on admission; in one she had purulent peritonitis from the rupture of an unsuspected pyosalpinx, which co-existed; and in another, the cyst had ruptured into the pleural cavity, and septicæmia had set in. All these were exceedingly unfavourable cases, and a fatal result almost inevitable under any circumstances. Dr. Thomas's table contains seventeen such cases, with five deaths, of which one was due to hæmorrhage from a gastric ulcer; in a second, the patient was moribund from pneumonia, and in a third the cause of death was obscure and, probably, not attributable to the operation. Dr. Gardner's cases show the very favourable result of five cases without a death. If, then, it were permissible to qualify the figures quoted by the exclusion of these deaths, in which the operation had no share, they would show a remarkably favourable result for so formidable a proceeding as the simultaneous opening of two great cavities of the body.

Finally, it is impossible to avoid the application of the great principles of surgery to hydatids and difficult to resist the conclusions to which they lead. They are essentially foreign bodies, and foreign bodies, moreover, which grow, and damage as they grow; if they are long borne with tolerance, there yet comes a time when the presence of the parasite is no longer tolerated by its host, or when by pressure, rupture, or suppuration, it causes disasters, perhaps irretrievable. The radical operation rids the containing organism of its invader once and for all—puncture *may* kill it, but it remains as a foreign body still, capable it is true in virtue of its nature, of harmless retrogression, but equally capable of becoming a focus of dangerous and uncontrollable activity. Which is the more rational proceeding, from the point of view, either of the principles of Surgery or of Pathology?

In the interest of surgery, I regret that I have not been able to include in my list any case of hydatids of the brain. I operated this year on one of Dr. Verco's hospital patients who, from his symptoms, might have been thus affected and, by aspiration, drew forth a considerable amount of clear limpid

fluid from some depth within the brain. There was, however, after careful examination, no microscopic evidence of the presence of a parasite and, I suspect, the symptoms were due to distention of the ventricles by cerebro-spinal fluid. On subsequent chemical examination of the fluid by Professor Rennie no characteristic could be discovered which would entitle one to say which of these two fluids it was. From its composition it might have been either the one or the other. Nor can I find that any diagnostic sign exists whereby these fluids may be chemically distinguished from one another. The patient recovered from the operation, and was temporarily improved, but the symptoms soon recurred and the exact nature of the disease remains as yet unknown.

The Radical Operation.—I have not considered it necessary in this paper to describe in detail the steps of the operation which is here advocated. That has been very fully done in Australia by Drs. Thomas and Gardner, in their valuable papers read before the last meeting of Congress, and yet more recently by Dr. Graham, in his work on hydatid disease. With slight variations, the method adopted in Adelaide is that described by these writers. Personally, I always make an effort, after the exposure of the cyst, or the organ containing it, to make fast the one or other, as the case may be, to the abdominal or thoracic parietes *before* incising. This can usually be done, if the cyst wall be not very thin, without any escape of contents, and if a little fluid should happen to follow in the track of the needles it is easily caught by sponges judiciously arranged. So soon as the free incision permits, the finger should be slipped immediately into the cavity, and additional sutures can be then passed at leisure while the finger securely holds the opening in position till this is safely secured to the external wound. I do not now generally bring these through the skin. During the course of the evacuation of the contents, which will be taking place while the sutures are being fixed, the mother cyst often presents itself, and invites removal; if it does not then appear it will do so subsequently, or may be easily caught by suitable forceps, but it is brittle and apt to tear unless the traction be judiciously and gently applied. Subsequent irrigation will enable all the remaining contents of the cyst to be washed out, and it is an essential part of the principles of the operation that this should be done completely and thoroughly at the time of operation, or on the earliest possible occasion afterwards. If large, we close the wound except so far as to leave room for drainage, and I think I see an advantage in using two tubes, of which one is imperforate, and is passed to the bottom of the evacuated cavity. This facilitates subsequent washing out, for it is then certain that fluid, passed through this tube, reaches the depths of the wound. This washing we repeat at subsequent dressings, except in certain hydatids of the lung where irrigation may produce distressing cough, or even some degree of suffocation. In such cases, swabbing with an absorbent tampon, just wet, may suffice to remove any undesirable collection. For dressing, if the cavity left is small, we use alembroth gauze with, or without, iodoform powder applied next the wound, or, if the cyst cavity is large, a cushion of oakum enclosed in a covering of antiseptic gauze and sprinkled with iodoform. It is suprising how speedily large cavities close up, and how slight are the constitutional effects.

In operations upon the thorax it is necessary to remove a part of one, or perhaps of two ribs, and this can readily be done sub-periosteally without wounding the parietal pleura, or the intercostal artery. Once only have I seen the latter accident happen, but in the absence of the piece of rib there was no difficulty in securing the vessel.

CONCLUSIONS.

The conclusions, then, to which I have been led by an examination of the statistics to which I have had access, by my personal experience, and by observations of the practice of others, are as follows:—

1. While aspiration, or any other form of tapping, fails absolutely in a large proportion of cases of hydatid cysts, no such objection can be made to Lindemann's operation, the fundamental principle of which is complete removal of the parasite.
2. The results of this operation, in cases of intra-thoracic and intra-abdominal hydatid, justify its adoption as a *general practice* in such cases as being attended by less ultimate risk to life than any other form of treatment.
3. In suppurating, or ruptured cysts, no other treatment is justifiable.
4. Possibly there may be a certain number of unruptured cysts of comparatively small size, with thin walls and limpid contents, to which aspiration may be appropriate, but it is doubtful whether, in any case, this exception should be extended to intra-thoracic cysts in which the radical operation has produced highly satisfactory results.
5. Information is required as to whether the radical operation or the expectant treatment should be adopted in pulmonary cysts in which the expectoration of skins has already commenced and is in progress without urgent symptoms having been manifested.

To Dr. Perks, medical superintendent of the Adelaide Hospital, my best thanks are due for much kind assistance afforded me in the preparation of the accompanying tables; indeed, whatever value may be found in my presentment of the subject is largely due to his willing and efficient co-operation.

(Tables of the cases referred to in this paper will be found on pages 420 to 426.)

TABLE I.—Operations for Hydatids at the Adelaide Hospital (from January, 1888). (*Dr. Stirling.*)

No.	Date of Operation.	Surgeon.	Sex.	Age.	Position of Parasite.	Nature of Operation.	Character of Cyst and Contents.	Treatment of Cyst and Contents.	Results.	Remarks.
1888.										
2	2 Jan.	Dr. Thomas.	M.	..	Liver, right lobe.	Thor. sect., res. 7th rib. (Pleura & diaphragm stitched to parietes.)	Large cyst	Removed	Death.	Pneumonia, empyema; pleural cavity had to be reopened and drained.
2	12 "	"	M.	14	" "	Thor. sect., res. 7th rib.	" purulent fluid	"	Cure ..	Hydatid apex of lung removed December, 1886. Hydatid of liver aspirated August, 1887. Hydatid left lung removed November, 1887. See also below (April 6).
3	25 "	"	F.	22	" "	Abd. sect.	" with many daughter cysts.	" later)	" ..	Hydatid very deep in liver. Operation had to be suspended owing to collapse of patient. Mother cyst washed out piecemeal subsequently.
4	12 Mar.	"	F.	22	Pleura	Thor. sect., res. 9th and 10th ribs.	Purulent fluid, with fragments of mother cysts.	Cavity drained.	" ..	December, 1887, Hydatid of pleura (right), Thor. sect. and removal of cyst. In June and July, 1888, this incision reopened and several small cysts evacuated.
5	7 "	"	F.	18	Liver, right lobe.	" "	Small cyst, with several small daughter cysts.	Removed	" ..	Hydatid removed from left lobe liver December, 1887.
6	17 "	"	M.	16	" "	Abd. sect.	Single cyst .....	" .....	" ..	.....
7	17 "	"	M.	16	Psoas muscle, right side.	" " in loin....	" .....	" .....	" ..	.....
8	0 Apr.	"	M.	14	Lung	Thor. sect., inc. below angle of scapula.	Purulent fluid	Drained	" ..	Cyst had been aspirated in Melbourne twice during previous six months.
9	8 "	"	M.	21	" left....	Thor. sect., res. 9th rib	Fœtid pus and fragments of hydatid membranes.	"	" ..	Advanced morbus cordis precluded radical operation.
10	16 "	"	F.	50	Liver	Aspiration	Six ounces clear fluid withdrawn.	"	" ..	Pneumonia (septic).
11	15 May	"	M.	51	"	Thor. sect. res. ribs ..	Fœtid pus, fragments of mother, and many daughter cysts.	Removed	Death.	.....
12	24 "	"	F.	16	Omentum ..	Abd. sect.	" " " "	"	Cure ..	.....
13	8 Aug.	"	F.	29	Liver	"	Large cyst, with daughter cysts, and about 20 ounces of fluid.	" .....	" ..	.....
14	17 Sept.	"	F.	..	Omentum ..	"	Thickened mother cyst, with shrunken daughter cysts.	"	Death.	Shock.
15	3 Oct.	"	F.	18	Pect. major muscle, right	"	Small cysts	"	Cure ..	.....
16	23 Nov.	"	F.	18	Lung, right..	Thor. sect., res. 3rd, 4th, and 5th ribs.	"	"	" ..	Right mamma turned up for resection of ribs.
17	24 "	"	M.	18	Liver	Abd. sect.	Large cyst, with purulent fluid contents.	" .....	" ..	.....

TABLE I—continued.

No.	Date of Operation	Surgeon.	Sex	Age	Position of Parasite	Nature of Operation.	Character of Cyst and Contents.	Treatment of Cyst and Contents.	Result.	Remarks.
18	1889. 23 Jan. . .	Dr. Poulton..	M.	53	Liver, right lobe.	Abd. sect.	Large single cyst	Removed	Cure ..	Broneho-pneumonia at time of operation.
19	30 " " . .	" Stirling..	F.	60	" " "	Thor. sect., res. 9th and 10th ribs.	Calcified ectocyst with purulent contents.	"	" ..	In November, 1888, swelling in right hypochondrium opened spontaneously, which discharged and then closed; cyst refilled. Pleura and diaphragm sutured to chest wall; liver with cyst retracted. On twelfth day incision made into upper surface of liver, and cyst removed. Gland destroyed, small sinus opening.
20	6 Feb. . .	" Gardner..	F.	19	" " "	Thor. sect., res. 8th and 9th ribs.	Large cyst	"	" ..	
21	1 Mar. . .	" " "	F.	?	Mamma, right	Excision mamma and remains of cyst.	Fragments of mother cyst.	Removed with mamma.	" ..	
22	16 " " . .	" Poulton..	F.	47	Liver.	Abd. sect.	Large cyst, with purulent fluid, and many daughter cysts.	Removed	" ..	
23	17 Apr. . .	" Gardner..	F.	51	Omentum ..	" " "	Single cyst	"	" ..	
24	3 May " . .	" Stirling..	F.	"	Liver.	" " "	Large cyst, with about 500 daughter cysts.	"	" ..	
25	17 " " . .	" Poulton..	M.	25	" " "	" " "	Large cyst, with pus and daughter cysts.	"	" ..	Some peritoneal adhesions over cyst to abdominal wall at time of operation; counter incision November 16th, to drain cyst more completely.
26	2 June. . .	" " "	F.	17	Spleen	" ineis. between lower ribs.	Pus and debris only	Drained	Death..	24/8/89, asthenia.
27	7 " " . .	" Gardner..	F.	"	Liver.	Abd. sect.	Large cyst	Removed	Cure ..	
28	12 " " . .	" Way	F.	31	In pelvis ..	" " "	Small cyst, with many daughter cysts.	"	" ..	This cyst, previously unsuspected, was discovered during operation for removal of left ovary and tube.
29	3 July. . .	" Poulton..	F.	10	Liver.	" " "	Single cyst	"	" ..	
30	18 " " . .	" Gardner..	F.	22	" " left lobe	" " "	Large cyst, and several daughter cysts.	"	" ..	See notes of operation, January 25th (No. 3) for other hydatid.
31	30 Aug. . .	" " "	F.	28	" " right lobe.	Thor. sect., res. of 6th, 7th, and 8th ribs.	Mother cyst, undergoing fatty degeneration; many daughter cysts.	Mother cyst not removed; drained.	Death..	Purulent peritonitis from bursting of pyosalpinx.
32	11 Sept. . .	" Stirling..	F.	14	Liver.	Abd. sect.	Large cyst, with many daughter cysts.	Removed	Cure ..	
33	26 " " . .	" Gardner..	F.	19	Pleura, right	Thor. " "	Several small cysts and pus evacuated; no mother cyst discovered.	"	" ..	
34	2 Oct. . .	" " "	M.	45	Liver.	Abd. " "	Ectocyst. calcified, containing foetid gas, pus, and debris.	Drained	Death..	Post-mortem, septic pneumonia.
35	24 " " . .	" Stirling..	F.	22	Lung.	Thor. sect., res. 7th, 8th, and 9th ribs.	Large cyst, with purulent fluid	Removed	Cure ..	Aspirated nine months before, and large quantity fluid withdrawn; has coughed up some "skins" since that time.

TABLE I—continued.

No.	Date of Operation	Surgeon.	Sex	Age	Position of Parasite.	Nature of Operation.	Character of Cyst and Contents.	Treatment of Cyst and Contents.	Result.	Remarks.
36	1889. 30 Oct. ..	Dr. Gardner.	F.	18	Liver.....	Abd. sect.	Large cyst, with daughter cysts	Removed	Cure ..	.....
37	18 Nov. ..	" "	M.	23	Lung, right..	Thor. sect., res. 7th, 8th & 9th ribs; pulm. pleura stitched to opening.	Single	"	Death.	Pneumonia, left lung.
38	13 " ..	" "	M.	33	" "	Thor. sect., res. 5th and 6th ribs.	Large cyst, with daughter cysts.	"	Cure ..	.....
39	13 " ..	" Stirling ..	F.	24	Liver.....	Abd. sect.	" with purulent fluid and fragments of daughter cysts	Drained	Death..	Septic pneumonia.
40	11 " ..	" Gardner ..	F.	20	Temporal muscle.	Excision	Size of pigeon's egg, with many small daughter cysts.	Removed	Cure ..	.....
41	12 Dec. ..	" Marten ..	F.	25	Liver.....	Abd. sect.	Single cyst .....	" ....	" "	.....
42	19 " ..	" Poulton ..	M.	50	" "	" "	Large cyst, with many daughter cysts.	" ....	" "	.....
43	1890. 21 Jan. ..	" Verco ..	M.	16	Lung, left ..	Thor. sect., res. 4th rib	Large cyst with gelatinous softened wall and pus.	"	" "	See Nos. 2 and 8. Free from expectorations of "skins" till six weeks ago.
44	22 " ..	" Poulton..	M.	40	Iliac fossa ..	Abd. sect.	Cyst, large as goose's egg, with many daughter cysts.	"	" "	Adventitious sac closely adherent to iliac vessels.
45	26 Feb. ..	" Giles....	M.	72	Pleura, left..	Thor. sect., res. 7th rib.	Pus and shreds of hyd. membranes.	Drained ....	" "	.....
46	3 Mar. ..	" Thomas..	F.	16	Liver.....	Abd. sect. ....	" "	" ....	" "	.....
47	2 April..	" Gardner..	M.	49	" "	" "	Dark red grumous material; no fragments of hydatid membranes found.	" ....	" "	.....
48	9 " ..	" "	F.	26	" "	Section in right loin then abd. sect.	Mother cyst had undergone calcareous degeneration; fragment attached to right lobe liver; some pints of purulent fluid and many daughter cysts in abdominal cavity.	Removed ..	" "	March 27th, aspirated, 36 oz. fluid withdrawn from abdomen; patient pregnant, aborted shortly afterwards. In operation cyst not reached by first incision, then abdominal section performed when cyst ruptured into peritoneal cavity; fluid puriform.
49	18 June..	" Poulton..	M.	65	" "	Abd. sect.	Large cyst with one daughter cyst	" ..	" "	Operation for cyst right lung three years previously; removed.
50	23 July..	" Gardner..	F.	13	Lung, right..	Thor. sect., res. of 5th rib.	Large cyst..	" ..	" "	See also operations, September 26th, No. 53.
51	6 Aug. ..	" Poulton..	F.	5	Liver, right lobe.	Abd. sect. ....	" ..	" ..	" "	.....
52	6 " ..	" Stirling ..	M.	50	" "	Thor. sect. res. of rib;	" and daughter cysts..	" ..	" "	.....
53	26 Sep. ..	" Poulton..	F.	5	Lung, left ..	pleura stitched to chest wall.	" ..	" ..	" "	.....

TABLE I.—*continued.*

No.	Date of Operation	Surgeon.	Sex.	Age	Position of Parasite.	Nature of Operation.	Character of Cyst and Contents.	Treatment of Cyst and Contents.	Result.	Remarks.
54	1890. 1 Oct.	Dr Stirling..	F.	22	Liver, right..	Thor. sect. res. of ribs; incision through diaphragm; pleura and diaphragm stitched to chest wall.	Large cyst and daughter cysts..	Removed....	Cure ..	.....
55	22 " "	" Gardner	F.	30	Liver	Thor. sect., res. 6th rib, incision through diaphragm.	" no daughter cysts, purulent contents.	" ..	Death 10th day.	Cyst had ruptured into right pleura, patient admitted with symptoms of septicæmic poisoning and very low.
56	22 Nov...	" "	M.	65	"	Abd. sect.	Large quantity pus and bile-stained fragments mother cyst.	" ..	Death..	Moribund from septicæmic poisoning on admission.
57	1891. 7 Jan. ..	" "	M.	56	"	"	Pus, with shreds of mother cyst no daughter cysts.	Drained	Cure ..	Aspirated 4th December, 1890, and 20 oz. clear fluid withdrawn.
58	27 Feb...	" Jay	M.	60	"	"	Cyst size of swan's egg	Removed....	" ..	From cyst cavity exploring needle struck another, but this could not then be attacked owing to collapse of patient. On 16th July, 1891, patient presented himself with incision bulging. On exploration soft friable mass presented (sarcoma); died some months subsequently. No <i>post-mortem</i> obtainable.
59	11 Mar...	" Giles.....	F.	?	Omentum ..	"	Large, with many daughter cysts	" .....	" ..	.....
60	3 April..	" Way	F.	38	Liver	"	Ruptured before admission, peritoneum full of pus and fragments of membranes.	Drained	Death in a few hours.	Moribund on admission. <i>Post-mortem.</i> —Suppurative peritonitis.
61	13 May ..	" Poulton ..	F.	39	"	"	Large cyst and many daughter cysts; mother cyst not removed owing to collapse of patient.	"	Death..	Thrombosis of vena cava from pressure of parasite, enormous distention from ascites, many pints ascitic fluid, removed by aspiration at various dates before admission; patient very low on admission.
62	" "	" Jay	M.	60	"	"	Large cyst, with purulent fluid and many daughter cysts.	Removed....	Cure ..	See date, 27th February, 1891, for first operation.
63	7 July ...	" Stirling ..	M.	67	Liver, right lobe.	Abd. sect., peritoneal adhesions over cyst.	No mother cyst found, estimated number of daughter cysts, 27,520; bile-stained fluid, 20 pints.	"	" ..	Had been tapped for exploratory purposes before admission and this day, bile-stained fluid withdrawn; mass of pure bilirubin, weighing 1·13 grammes, in cyst; daughter cysts stained with flakes of same.

TABLE I.—*continued.*

No.	Date of Operation	Surgeon.	Sex.	Age	Position of Parasite.	Nature of Operation	Character of Cyst and Contents.	Treatment of Cyst and Contents.	Result.	Remarks.
64	1891. 22 July..	Dr. Stirling..	F.	21	Lung, pleura	Thor. sect., res. of the 9th rib.	Cyst had ruptured into pleural cavity, which was filled with purulent fluid and daughter cysts; membranes of mother cyst removed from lung.	Removed....	Cure..	Aspirated pleura, 19th July, 1891, 47 oz. clear hydatid fluid drawn off.
65	22 "	"	F.	6	Kidney, right	Abd. sect.	Single cyst, size of goose's egg.	"	"	"
66	19 Aug...	"	F.	6	Liver, right..	Abd. sect.	Single cyst, with fluid contents, size of hen's egg.	"	"	"
67	23 July..	" Poulton..	M.	24	Liver, left lobe.	"	Fetid pus, gas and fragments of membranes.	"	"	"
68	23 Aug...	"	M.	24	" right lobe	"	Large cyst, daughter cysts, and fluid purulent.	"	"	"
69	2 Sept...	"	F.	35	"	Thor. sect., res. ribs	Large cyst.	"	"	"
70	23 Oct...	"	F.	35	Lung, left..	Thor. sect., res. ribs	Two separate cysts, no daughter cyst.	"	"	"
71	23 "	" Giles	M.	13	Liver.....	Abd. sect.	Single cyst.	"	"	"
72	2 Dec...	"	M.	34	Lung, left..	Thor. sect. See note	"	"	"	On opening pleura lung retracted, hydatid was reached by needle, and fluid with scolices drawn off, could not be otherwise reached, drain left in pleural cavity.
73	27 Jan...	" Poulton..	F.	36	Liver, left lobe	Thor. sect., res. of 9th rib.	Two mother cysts, with purulent fluid.	"	"	Pleural cavity closed immediately.
74	3 Feb...	"	F.	28	" right lobe	"	Large cyst, with daughter cyst.	"	"	"
75	2 Mar...	"	M.	14	Liver.....	Abd. sect.	Single cyst	"	"	"
76	23 " "	"	M.	27	" right lobe	Thor. sect., res. of 7th rib.	"	"	"	"
77	20 April..	"	M.	68	Spleen	Abd. sect.	No mother cyst; large number daughter cysts.	Drained	Death..	Radical operation for removal of hydatid of liver nine years ago.
78	22 " "	" Jay	F.	22	Liver.....	"	Single cyst	Removed	Cure ..	Shock; old and feeble patient.
79	19 May..	" Poulton..	M.	65	Kidney, right	" (Lumbar)	Fetid purulent contents; large cyst and many daughter cysts; mother cyst not removed, owing to collapse of patient.	Drained	Death, 14/6/92.	"
80	2 June..	" Giles	M.	27	Liver	"	Single cyst	Removed	Cure ..	Fecal fistula between sac and caecum. Post-mortem. - Right kidney obliterated by parasite; left kidney chronic interstitial nephritis.

TABLE II.—Summary of Operations for Hydatids at the Adelaide Hospital, from 1st January, 1888, to 30th June, 1892. (*Dr. Stirling.*)

Position of Parasite.	Operation.	1888.	1889.	1890.	1891.	1892. to 30th June.	Result.		Total.	Per-centage of Deaths.
							Cure.	Death.		
Hydatids of—										
Pleura.....	Thor. sect.	1	1	1	..	..	3	..	3	6·6
Lung	„ „	3	3	3	3	..	11	1	12	
Liver	Thor. Abd. sect...	4	3	2	1	3	9	4	13	30·7
Liver	Abd. sect.	4	13	7	10	3	32	5	37	17·
Spleen.....	„ „	..	1	..	..	1	..	2	2	
Kidney	„ „	..	..	..	1	..	1	..	1	
Omentum	„ „	2	1	..	1	..	3	1	4	
Pelvis	„ „	1	1	1	..	..	3	..	3	..
Kidney	Lumbar sect.	..	..	..	..	1	..	1	1	
Liver	Aspiration	1	..	..	..	..	1	..	1	
		16	23	14	16	8	63	14	77	..
Extra-visceral—mammary, pectoralis major, and temporal muscles—excised									3	..
Total.....									80	..

TABLE III.—Summary of Causes of Death.

No. of cases.	Nos.	Causes of Deaths.
	11, 34, 30, 55, 56	<i>Septicæmia, pneumonia.</i> In all these, contents of cysts were purulent and fetid; two (Nos. 55, 56) were moribund on admission; others had symptoms of septic poisoning.
2	31, 60	<i>Suppurative Peritonitis.</i> No. 31, from bursting of pyo-salpinx into peritoneal cavity; No. 60, from rupture of hydatids into peritoneal cavity; moribund on admission.
1	79	<i>Ch. Interstitial Nephritis.</i> One kidney destroyed by hydatids, other cirrhotic.
1	61.....	<i>Thrombosis of Vena Cava Inf.</i> from pressure of cyst, enormous ascites; very low on admission.
2	1, 37	<i>Pneumonia.</i> One following removal of hydatid from lung; one following empyema after thor. sect. for hydatid of liver.
2	14, 77	<i>Shock.</i> One after section for omental hydatid; one after section for large splenic hydatid in an old and feeble patient.
1	26.....	<i>Exhaustion.</i> Two months subsequently.
Total, 14		

TABLE IV.—Dr. Gardner's Cases. (Dr. Stirling.)

No.	Surgeon.	Sex.	Age	Position of Parasite.	Nature of Operation.	Character of Cyst and Contents.	Treatment of Cyst and Contents.	Result.	Remarks.
1	Dr. Gardner.	F.	25	Liver.....	Abd. sect.	Single cyst	Removed..	Death	On fourth day peritonitis, probably due to escape of fluid.
2	"	F.	..	Pleura	Thor. sect. ..	"	" ..	Cured	Pneumo-thorax <i>ab intra</i> before operation.
3	"	M.	..	Liver.....	Abd. sect. ....	" .....	" ..	"	.....
4	"	M.	15	Lung	Thor. sect.	"	" ..	"	Middle lobe of right lung.
5	"	M.	34	Liver.....	Abd. sect. ....	" .....	" ..	"	.....
6	"	F.	29	"	Thor. sect. Part of two ribs removed.	"	" ..	"	Convex surface of liver.
7	"	M.	23	Kidney	Abd. sect. ....	" .....	" ..	....	Langenbuch's incision
8	"	M.	..	Lung.....	Thor. sect.	Cyst not found	Drained....	Death	Ribs resected, fluid ran out; cyst collapsed and could not be found, although skins previously spat up. At <i>p.m.</i> cysts found to arise from pericardium and to press on both auricles.
9	"	F.	30	Liver.....	Abd. sect.	Mother cyst, hundreds of daughter cysts.	Removed..	Cured	Suppuration had set in.
10	"	F.	19	"	"	Single cyst	" ..	Death	At <i>p.m.</i> an opening found at back of cyst, which was due to erosion from pressure against spine.
11	"	M.	..	Lung.....	Thor. sect.	"	" ..	Cured	.....
12	"	F.	..	Liver.....	Abd. sect.	Mother and daughter cysts.	" ..	"	.....

None of these cases had been previously tapped.

Multiple Hydatids and their Origin

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THE mode of origin of multiple hydatid cysts is an interesting point in connection with this disease, which has still to be demonstrated by experimental proof and clinical observation.

The question whether multiple cysts can develop in any way other than by the ingestion of the ova of the *tænia echinococcus* is of some practical importance in view of the fact that treatment by means of aspiration is still largely practised.

Hydatid disease, as it is most commonly met with, presents itself as a single cyst occupying the liver; less frequently the general peritoneal lining, especially the visceral portion, may be the seat of a large number of cysts, exhibiting much variation in size and development. The liver and lungs are occasionally found to harbour hydatid cysts to the number of three or four; but among such cysts there is generally a nearer approach to uniformity in size and development than is the case in multiple hydatids of the peritoneum. It is only on the serous lining of the abdomen, and especially on the anterior surface of the great omentum, the great and small intestines, and the pelvic pouches that large clusters or bunches of cysts are found, each apparently independent of the other, and furnished with a distinct fibrous ectocyst. As a matter of common observation it is noticed that the hydatids found in the peritoneum in this multiple form are nearly always small, resembling in their range of variety the size which daughter cysts attain inside a parent hydatid. Great numbers of them are frequently very minute, comparable in size to a millet seed or even smaller, in some cases where such cysts were observed to exist in countless numbers, the largest of them did not exceed in size an ordinary marble.

It is assumed that patients become infected with this disease by the ingestion of many ova. The small size of the ovum, and the great numbers that infected dogs are capable of voiding, make this assumption highly probable. The cases of multiple cysts would then be easily explained, but in the case of solitary hydatids the fittest embryo alone must have survived, and all the others gone to the wall.

The stagger-worm of the sheep (*tænia cœnurus*) is usually found as a solitary cyst in the brain, but scattered throughout the liver and lungs are many evidences of minute cysts that have died in the early stage of their development. It is suggested that there may be a close analogy between the stagger-worm in the sheep and the solitary hydatid in man, but as the hydatid patient usually only comes under observation after the disease has run a course of years all traces of the other embryos may have become entirely obliterated.

It has long been demonstrated that the hydatid cyst has the power of manifold proliferation, the power of reproducing itself by exogenous growth; when the same process takes place endogenously we have one of the different

methods by which daughter cysts are produced. It is, therefore, possible that in a case of multiple hydatids we may have not only the original emigrants, but their descendants, the one undistinguishable from the other. The method of exogenous cyst formation is common among animals that are susceptible to the disease, as for example the pig, and this possibly explains how it is that in the pig's liver the cysts are numerous, small and close together.

In the rare form of *echinococcus multilocularis*, a condition generally mistaken for colloid cancer, Virchow was the first to show that this morbid condition in the liver resulted from repeated external proliferation of secondary cysts, which, at a subsequent stage of their development, become separated from each other by a fibrous stroma.

It is evident, however, that the method of external proliferation is not a common factor in the production of multiple cysts in the human subject, because the supposition is only possible when the bladders, large and small, lie in close proximity with each other, or at short intervals; our experience on the other hand tells us that this is not the case, that on the contrary they are often so wide apart that no such origin could be assigned to them.

Another important method of secondary hydatid formation is seen in the case of the so-called daughter cysts, which are generally found retained within the parental boundary. They have been proved to arise—

- (1) From sacculations of the parent cyst-wall.
- (2) From brood-capsules.
- (3) From scolices.

All three methods may be at work in the same cyst. From the myriads of brood-capsules and scolices present in a fruitful hydatid—the so-called scolices pariens—the great majority of the daughter cysts would naturally arise. We occasionally see, on examining the inner surface of a hydatid areas of cauliflower-like excrescences, still structurally related to the parent wall. These are secondary cysts, which have either become aborted in their development, or have not reached such a stage of growth as to enable them to lead an independent existence.

The changes by metamorphosis which the brood-capsules undergo, commence while they are still vitally related to the cyst wall, and, similarly, the scolices, while within the brood-capsule, may show like changes while still attached by their characteristic stalks to the wall of the brood-capsule. It seems probable that the presence of cysts within daughter cysts, as is occasionally observed, may be partly accounted for by the simultaneous metamorphosis of the brood-capsules and the contained scolices. The scolices, however, usually burst through the wall of the brood-capsule before the metamorphosis is complete, and the developmental changes continue in their free or independent state. The chief point of difference between the daughter cysts and the primary hydatid is that, in the former, heads or scolices, are formed much sooner than in the latter. In the parent cyst they are rarely if ever found until the cyst has reached the size of a walnut, in the secondary they are found in cysts of all sizes from the most minute. Virchow, in his researches on *Echinococcus multilocularis* form, found them in secondary cysts so small that a single scolex filled up the whole interior.

An important question that arises at this point is, can these brood capsules and scolices, which form multiple cysts inside a hydatid, say, in the liver, complete their development, if they are enabled to migrate to any other

part of the body? Secondary cysts formed by the process of external budding, *i.e.*, exogenously, can evidently do so, as we have seen; they soon part company with the parent wall, and are no longer dependent on it for existence or nourishment. There seems no apparent reason to doubt that liberated scolices have this power, assuming that they are mature when they leave their original home, and that the structural changes have commenced in them, which are seen to occur before they assume the cystic form. Such a soil as a moist serous membrane offers unlimited nourishment to an organism that gets its food by the process of endosmosis. Any evidence that we have which seems to support this view is so far only of that nature which clinical and *post-mortem* appearances furnish, and therefore not absolutely conclusive. The question is one which appears to lend itself to experiment for actual proof, but this interesting point is still open to workers in this subject.

I injected into the abdominal cavity of two sucking pigs, about 6 drachms of hydatid fluid, obtained from a cyst in the human subject. In one case the fluid was taken from a large cyst in the liver. With the aid of the microscope I satisfied myself that the fluid contained very many scolices and brood-capsules. In the other the fluid, with the scolices, was taken from several daughter cysts from the same hydatid. A few minutes only intervened before the fluid was transmitted to the pigs. The animals were fed on pollard and milk, and kept for six months before they were killed. A careful examination failed to show any traces of cyst formation, or any evidence whatever of hydatid material or debris. A possible fallacy in such an experiment is the method adopted of infecting the pigs. The point of the needle which was used may have been passed into the interior of the gut.

The method of experiment which I contemplate employing on a second trial, with the kind permission of the Professor of Physiology in this Medical School (who has the license for vivisection work), will ensure that the peritoneum is opened by means of a small incision, and the scolices will be transmitted directly to the serous lining. Such an experiment, however, may fail, after repeated trials, and bring us no nearer the truth, because so many vital factors are at work. As Leuckart puts it—"It is not exclusively the number of imported germs which determines the issue of a helminthological experiment, but also the sum total of the circumstances under which the introduction and development of the young brood occurs."

To explain all the cases of general peritoneal infection on the theory that they have arisen from liberated scolices and brood-capsules, implies that they must have escaped through some leakage in the parent cyst wall. It is inconceivable that they should reach the blood stream by a process of boring, as is the case with the six-hooked embryo when liberated from its capsule by the act of digestion in the stomach.

Leakage from a cyst, say, of the liver into the general cavity of the abdomen, is very apt to occur whenever a needle or trocar is passed into it, or it may happen from causes of an accidental nature. The passage of hydatid fluid in this manner is often followed by well-marked symptoms, such as collapse, rigor, pain, the appearance of a rash, &c. The fluid itself, however, when free from any of the products of decomposition, does not appear to be an irritant to the peritoneal lining. I have satisfied myself on this point by opening the abdominal cavity of several dogs, and transmitting some fresh hydatid fluid, without apparently giving rise to any inflammatory trouble.

It is conceivable that a hydatid cyst in some one of the abdominal viscera may rupture from such a cause as pressure or straining without producing any serious symptoms at the time. It is noticed, now and then, that in the

act of tapping the cystic swelling suddenly disappears, and free fluid is shortly afterwards discovered in the abdominal cavity, and yet the patient has shown no appreciable sign of distress.

In every case of multiple hydatid in the abdominal cavity that I have seen one of the cyst has always been in the liver, and this is the experience of many others who have specially considered this point. In one case where small cysts were scattered broadcast over the peritoneum, the cyst in the liver measured about $1\frac{1}{2}$ inches in diameter, and was quite degenerated, while all the others were healthy.

Some months ago I published the case of a patient who was operated on for a suppurating hydatid of the liver. She had been tapped about four months previously, and between two and three pints of clear fluid removed. The patient afterwards died from exhaustion; a careful examination was made by Professor J. T. Wilson, and a very interesting and striking condition was reported. On the anterior surface of the great omentum were numerous small whitish bodies, most of them about the size of sago grains. They were scattered irregularly over the organ, many of them were distinct from each other, while others were arranged in clusters. Here and there over the intestines these whitish bodies were visible, also over the serous lining of the kidneys. A very striking feature was seen in the most dependent positions, viz., the pouch of Douglas and the utero-vesical pouch. In these regions the surface of the lining was rough and irregular to the feel, it gave the impression that it was a mass of tubercle, but there was nothing about the naked eye appearance to suggest that they were of a hydatid nature. On making a section of one of these small bodies, and mounting it on a slide, the microscope showed the characteristic structure of the hydatid cyst, a well-defined mesh-work or loose areolar tissue—the ecto-cyst proper—and a laminated cyst wall lying curled up in the centre. There were besides a number of well-defined hooklets scattered throughout the field. All the features of this case seem to me to be strongly suggestive of the theory of cyst-formation from liberated scolices. It is difficult to imagine these numerous small cysts, heaped up as it were in the dependent pouches, having any other origin. Then, again, the fact that each of the specimens examined contained hooklets further supports this view of their origin. Had they originated from ova primarily introduced one would not have expected to find hooklets at all in cysts of their size. Again, in none of the specimens examined was there any trace of scolices, so that the presence of isolated hooklets in such a case is of some significance in elaborating a theory as to their mode of origin. In the metamorphosis of the scolex into the cyst the hooklets may persist even when the rest of the body of the scolex has disappeared, their calcareous structure enabling them to resist for a longer period the changes of disintegration. In this particular case the most feasible explanation that can be given of the presence of a number of isolated hooklets in the minute cysts is that they belonged to the circle which the scolex possessed before it altered its form, and that the scolices found their way out of the parent cyst in the liver, probably when the patient was aspirated, and the bulk of them having gravitated to the most dependent part, completed a further stage in the cycle of their development.

I do not for a moment maintain that every case of multiple hydatids in the abdomen has this particular mode of origin. We often see cases of multiple hydatids where there is no evidence of the liver cyst having ruptured either from treatment or by accident; still, as the so-called daughter-cysts are known to originate in several different ways, it seems to

no highly probable that the same thing may be said of these cases where there is general infection of the peritoneal cavity, and, if this view be granted it follows that leakage of hydatid fluid into a serous cavity is a thing to be avoided.

It may be asked how it is that so few cases are recorded where there was reasonable ground for believing that general peritoneal infection had followed the operation of tapping. It must be remembered that such secondary cysts, supposed to result in this way, rarely attain any considerable size ; probably about an inch in diameter represents the largest of them ; the great mass never seem to get beyond the size of a pea. Then again, many large cysts in the liver, though they may show the presence of innumerable scolices, do not seem to have the vital power of developing these scolices into secondary cysts. I am not aware that this condition of minute hydatid infection has been described in the cases of hydatid of the lung which have been tapped or ruptured.

Pulmonary hydatids are most commonly of the kind just referred to, where innumerable scolices are present, but do not usually pass into the stage of cyst formation.

Hydatids of Both Lungs and Both Lobes of the Liver. Four operations by incision. Recovery.

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THE following is a sequel to a case reported by Dr. Lendon and myself at the last session of the Congress, and is recorded in order to make it complete.

C.C., *æt.* 17, was readmitted to the Adelaide Hospital, S.A., on 15th January, 1890. Had remained well till six weeks ago; then came a cough, with expectoration of matter and skins, which has persisted. Pain in left infra-clavicular region since 11th January, 1890. There were the physical signs of a hydatid in the left lung, occupying the greater part of the upper lobe. Temperature varied from 100 degrees to 102 at night. On 21st January, 1890, under ether, I aspirated in the fourth left space in the lateral region and obtained pus, excised a rib, opened the hydatid cavity in the lung, removed the membranes, stitched the margins of the opening in the cyst to the chest wall, and drained with a tube. The cavity was traced upwards towards the axilla; downwards and inwards the pericardium could be felt, and the pulsations of the heart, while upwards and inwards were several small holes, presumably the openings of bronchial tubes. He did uninterruptedly well, and was sent to the convalescent home on 20th February, 1890, and has been well since.

This lad has had two aspirations, which, so far as can be determined, did no good, and two incisions through the thorax of large hydatids in the liver, one in each lobe, and two incisions of suppurating hydatids in the lung, one on each side, all successful.

Bothriocephalus Liguloides, the Cause of certain Abdominal Tumours.

WALTER W. SPENCER, M.R.C.S.

HEATH, a boy about three years of age, was brought to me from the Crudine, an old diggings more than 40 miles from Bathurst. He was suffering from a tumour of the abdominal cavity, which occupied quite half of that space, and extended from the hepatic to the right iliac region. On palpation, the tumour felt for the most part solid and fixed firmly to the abdominal walls, as it did not glide when the child rolled from side to side. It was of irregular shape, and at one rounded prominence I could detect fluctuation. At this point I aspirated, drawing off about one ounce of watery fluid mixed with a little pus. This puncture was situated about midway between the lower rib and the crest of the ilium. A few days afterwards I made an incision about two inches in length, through which escaped about one ounce of purulent fluid. An examination through the wound revealed the fact that the tumour was closely adherent to the abdominal wall, and that a canal or burrow extended backwards towards the kidneys of sufficient capacity to admit the forefinger, with which I, however, could not reach the bottom of the *cul-de-sac*. The wound was kept open and syringed with warm water and permanganate of potassium, and for several weeks pus was discharged from the opening, but without any apparent diminution in the size of the tumour. About two weeks from the date of the first incision I detected fluctuation at another point in the tumour, which I incised in a like manner, and from which escaped about an ounce of similar fluid. A canal of the same character, extending backwards, was opened, and it was treated by syringing through a flexible catheter, as was the first. Again I made an incision at a third fluctuating point, which was situated nearer the lumbar region than the two first, and which entered a similar canal to the others, and liberated a small quantity of pus. All these canals seem to have somewhat hard walls and to be immovable, giving the impression to the finger of cicatricial tissue. The wounds continued to discharge for several months, during which time the tumour wasted more than the patient did. The little fellow was much reduced, but eventually rallied, regaining his health, which now, after six years, I hear, is quite robust. I discarded the hydatid hypothesis from my mind, but remained in doubt as to the origin of the tumour, being reconciled by the good recovery.

In October, 1890, what appeared to be a case of the same character came under my care. S.P., four years, male, presented the same symptoms as the boy Heath—a large tumour occupying half the abdominal space, and extending on the right side from hepatic to iliac region, having the appearance of a large hydatid mass. On aspiration it yielded only a small quantity of slightly albuminous fluid, so I made a section anterior to the margin of the latissimus dorsi, and about level with the umbilicus. The mass of the tumour was not at this point adherent to the wall, so I stitched it to the edges of the incision. Treatment was materially the same as in the case of the child Heath, as a narrow passage was opened in firm and somewhat hard tissue, directed backwards to the lumbar region. A few days

after the operation the patient complained of pain and difficulty in micturition, and eventually passed per urethram a worm about 4 in. in length, and which appeared to have no sexual organs, was of a light pink colour, without segments, corresponding in both size and shape to Leuckart's specimens of *Bothriocephalus Liguloides* A. After the passage of the worm the pain was relieved, and the patient could micturate freely. A similar worm of small size was eventually discharged from the incision, and for many weeks pus, containing broken-down tissue (the debris apparently of other tæniæ), flowed from the wound. The progress of this case for several weeks was similar to that of the child Heath; but the ultimate result was not as fortunate, for after removal to his parent's residence (25 miles from Bathurst) the little patient gradually sank. I did not hear of his death for some time afterwards, so that I had not the opportunity of a *post-mortem*. I regret to say that the two specimens of *Bothriocephalus Liguloides*, which I for some time preserved in spirit, were dessicated by the evaporation of the spirit during a hot summer. The tumour was, I believe, formed by repeated attacks of inflammation in the connective tissues of the abdomen, caused by the worms, and possibly by the escape of small quantities of urine from the apertures in the urinary tract, through which the tænia gained access to the bladder. Though Manson states that these worms were discharged from the bladder in a case coming under his observation, yet their habitat is the subperitoneal connective tissue of their host, from which they might escape into the ureter.

As this is, as far as I am aware, the first time these tæniæ have been observed in Australia, I have ventured to draw attention to their occurrence, as it may explain the cause of some of the abdominal tumours which will no doubt come under your notice.

On the Treatment of Pulmonary Hydatids rupturing into the air passages.

R. HUMPHREY MARTEN, M.B., B.C., Cantab, M.R.C.S., Eng., L.R.C.P., Lond.
Assistant Surgeon, Adelaide Hospital.

By ruptured pulmonary hydatids I refer only to those which have opened into the air-passages, and not those of rupture into the pleural cavity nor the rare cases of rupture through the chest wall or into the pericardium. They may be conveniently divided into two classes, first, those in which, after more or less lung trouble, blood and hydatid membrane are coughed up, without any suppuration, and secondly, those cases in which a primarily suppurating hydatid, or a hydatid which has undergone putrefaction and suppuration after it has ruptured is being coughed up.

The much debated question of aspiration is here not under consideration, and the treatment resolves itself into either the expectant or a radical operation.

With regard to the first division, where the hydatid is in process of being coughed up, but without any suppuration, the point is, should the patient be allowed, whilst under strict observation, to continue to cough up the cyst, or would it be better to remove it by an external opening. In giving an answer I think several risks require consideration.

First, the danger that a piece of membrane may be dislodged, and being too large for expectoration, suffocate the patient.

Secondly, when all trouble is apparently over a daughter cyst may commence to grow, which renders the cure uncertain; (although pulmonary hydatids, according to Graham, do not commonly contain many daughter cysts), and

Thirdly, at any time suppuration may occur in the cyst, when operative measures are required at once.

Against these three points are the dangers of the operation itself, and I hope we shall have an expression of opinion from the members present as to what they consider the best method of treatment. We know from Dr. Stirling's tables that uncomplicated thoracic sections give a low death-rate of 6.6 per cent. but I know of no tables giving statistics of ruptured hydatids. As the operation here would be more difficult, owing to the inability to always localise a collapsed cyst, it would probably be much higher.

In the second class of cases, where putrefaction and suppuration have taken place a radical operation ought to be urged at once, for I think there can be little hope of permanent recovery or comfort for such patients when coughing up such offensive pus as is generally found in a hydatid cyst. In some cases, for a time, however, things may remain quiescent, but sooner or later the old symptoms will return, and gradually emaciation, with night sweats and exhaustion will bring about a fatal termination.

With regard to operative measures, the only way of treating a suppurating cyst is to open it, if in a suitable situation, and thoroughly drain it. As a rule, in such cases the pleural cavity will be obliterated, and as there is nothing to fear from this, supporting sutures will generally be unnecessary. I think washing out the cyst should certainly be avoided, for fear of setting up a cough or flooding the lungs through the open bronchial tubes.

With regard to the opening of suppurating cysts there is one point I should like to bring before the Congress which was very forcibly brought before me a few weeks ago, viz., the danger of opening suppurating hydatid cysts, communicating with the bronchial tubes, when the incision has to be made in the anterior part of the chest, and when good drainage is at first impossible.

A patient aged 54, who had been coughing up at intervals during the last nine years hydatid membrane, with much offensive pus, and was becoming greatly emaciated, and worn out by the constant discharge, asked me to drain the cavity which was situated at the right base in front, inside the right nipple line,—extending down to the liver dulness. Having explained the dangers of the operation to him, he decided to undergo any risk, as he felt himself that he was gradually going down hill.

The patient having been put under chloroform by Dr. Swift, I, assisted by Dr. Poulton, removed 2 inches of the fifth rib, just inside the nipple line, and having struck the cavity with an aspirator needle, I proceeded to open it; on doing this, the patient immediately passed into a serious condition, his breathing becoming bad, and his skin dusky, although the pulse remained fairly good. Improvement at first occurred, but in half an hour the patient died,—evidently from lung trouble, as his pulse remained fairly good till the end.

I believe this death was due to my opening a very thick sac, which, unable to collapse, allowed the external air to enter the cavity, and the foetid pus to flood the lungs, and so bring about the fatal termination.

The point in the treatment of similar cases which I wish to bring before the Congress is this: That where we have an old suppurating hydatid of the lung, communicating with the bronchial tubes, in a situation where the drainage is bad in the recumbent posture, the correct thing to do is to perform the operation in two stages:—1st. To remove a portion of rib, and in a day or so, when the patient is fully conscious, and if necessary is sitting up, able to cough and give assistance, to finish the operation by opening the cyst and inserting the drainage tubes. I believe that if I had done this in my case I should have averted a calamity, but we learn much more by our disasters than by our successful cases—and I bring this forward as a warning to any one who has a similar case to deal with.

Finally, we know that in some instances, when opening an unruptured cyst, after removal of a rib, or even after the puncture by an aspirator needle, death from flooding of the lung will occur, and I throw it out as a suggestion, that in all cases where drainage would be bad, or even in ordinary cases where we have a large hydatid to deal with, that the operation should be done in two stages; firstly, removal of a rib, and secondly, when the patient is conscious, and able to give assistance, the cyst should be opened and drained, cocaine being used if necessary.

On Treatment of Hydatids.

JOSEPH B. ROSS, M.D., Wurzb.

WHENEVER the different methods of dealing with hydatid cysts are being discussed Von Volkmann's method must not be left out of consideration.

Within the last three years of my private practice I have treated twenty cases of hydatid disease. In all of them the radical cure was employed. Amongst these were three cases treated by Lindemann's operation with three cures, and ten cases treated by Von Volkmann's operation with ten cures. The balance are such cases where the hydatid cyst had already formed firm adhesions with abdominal or thoracic-walls. In such cases one cannot speak of any special method. In other cases the cyst was so located that no vital cavities had to be opened for its removal.

I have had no personal experience of tapping; I have never employed it, and never intend doing so in the future.

A few years ago I advocated the adoption of Von Volkmann's method in the *Australasian Medical Gazette*. As far as I could learn the method has not been employed by other surgeons in Australia. The method seems to me to be hardly known. It consists, in short, in cutting down *on to the cyst*, and the plugging the wound with iodoform-gauze, &c., till firm adhesions have formed, which generally takes place in about seven days. This method is, to my mind, best adapted to those cases where after opening the abdominal, &c., cavity, the cyst or organ containing it protrudes well into the wound, and where "indicatio vitalis" does not call for immediate action. Von Volkmann's method has been put to the most severe tests at my hands. Amongst the ten cases operated upon were three where the hydatid cyst was situated on convexity of liver. In these cases both abdominal and pleural cavity were opened at same operation. Twice I have operated for lung hydatid, one situated in the left, the other in the right thorax. Once I performed the operation on two places at the same time, the cysts being situated in right and left lobe of liver. Almost all my cases were operated upon with lay assistance, sometimes even the administration of chloroform had to be entrusted to laymen. Two of my patients were over sixty years old; some cysts were really of an enormous size.

There can be no doubt that the patient after the second act of Von Volkmann's operation is actually, as far as recovery is concerned, placed in the same position as those upon whom Lindemann's operation has been *successfully* performed.

To judge of the relative merits of each operation we must first enquire what the *immediate results* of each operation are, *i.e.*, whether death has been due to the operation itself. I have collected forty-six cases in literature, where Von Volkmann's operation was performed, with two deaths, which were, however, not attributable to the operation. I will refer to these later on.

How does the matter stand with Lindemann's operation as regards this point? In Thomas' work, I find that death occurred in three cases within a week after the operation to all appearance dependent upon the operation. There are a few more cases, but the notes are too short to accurately judge of the exact relation of the cause of death to the operation. From verbal

information I could add four more cases where the patient died shortly after the operation, as the direct result of the operation. These cases were not reported.

From the facts adduced it is evident that Von Volkmaun's method is superior to Lindemaun's as far as immediate results are concerned.

Now I have both operations compared as far as ultimate results are concerned. Of the forty-six cases operated upon according to Von Volkmaun two died. One died eighteen days after operation. The woman was admitted to the hospital suffering from albuminuria. She had had several attacks of acute uræmia before admission. Although the patient was in a very low condition, Von Volkmanu thought that by removing the cyst which he supposed was pressing on the ureter that the patient would be saved. After opening the abdomen this assumption proved a failure. The patient died as the natural result of her kidney disease. In this case the operation was resorted to as a possible means of averting death from uræmia. No fever or any untoward symptoms followed the operation. The second death is a case of Tusservet. The patient died seven months after the operation. She was very prostrate before operation. Albuminuria came on, and she died exhausted by suppuration (Thomas, p. 70). We find, therefore, as the ultimate results of Von Volkmann's operation two deaths in forty-six cases, or 4.35 per cent. deaths. Leaving out the first case we have forty-six cases with one death, or 2.17 per cent. deaths.

Thomas collected 105 cases operated upon by radical operation of Lindemann with nineteen deaths, or 18.09 per cent. deaths. Leaving out two deaths not attributable to the operation at all, we have 105 cases with seventeen deaths, or 16.19 per cent. deaths. A close scrutiny of the cases collected by Thomas, as well as the results of operations performed subsequently, will alter perhaps the percentage of deaths.

According to F. Kamla, Lindemaun's operation had, at the hands of European surgeons, $6\frac{1}{2}$ per cent. deaths, whereas Von Volkmann's method had 0 per cent. deaths up to 1888. I venture to say that a surgeon conversant with aseptic surgery cannot fail to have successful immediate results with Von Volkmanu's method. The ultimate results are of course dependent upon various and circumstantial conditions.

A Rare Situation for a Hydatid Cyst.

CHAS. F. EICHLER, M.R.C.S., Eng., M.D., Heidelberg.

In the month of July, 1870, I was called to attend upon H.B.C., a man of 24 years of age, residing at Glebo Point. I found him suffering from retention of urine. He also had great difficulty in passing the feces. This was caused by an enormous enlargement of the prostatic gland, which almost filled the lower cavity of the pelvis. On palpation I found the prostatic gland uneven and very hard; no fluctuation could be detected, neither from perinæum nor by exploration with the finger per anum; the bladder was filled with urine, and the rectum contained a quantity of hard feces.

The disease appeared to me to be of a malignant character. The man was fairly nourished, and I could not detect any other bodily disease. With difficulty I was able to empty the bladder with a small elastic catheter. I also succeeded in relieving the bowels by an emollient enema, but the enlargement increased rapidly, and the introduction of the catheter became impossible. At this stage I proposed a consultation with one or two surgeons, to which he willingly consented. Two experienced surgeons were called, and both were of the same opinion, viz., that the disease was of a malignant character and incurable. I then proposed an exploration, which was agreed to, and I at once introduced the trocar, and to our great astonishment emptied the swelling of something over half a pint of limpid fluid, which proved to contain a large number of daughter-cysts and hooks. I syringed the cavity with a 10 per cent. solution of carbolic acid lotion, and afterwards injected two drachms of tincture of iodine diluted with an equal quantity of water. A fortnight later complete recovery took place, and the patient is yet alive and well.

I bring this short paper before you, as I consider the peculiar situation of the hydatid cyst in the prostatic gland an unusual occurrence. Among a great number of echinococcus cases which I attended during a forty years' practice in this city I never met a similar one.

Of the different cases I attended I may mention a remarkable one of a young man of 18 years of age, who resided at Rocky Point, Cook's River Road, who was suffering from hydatids of the liver, he being without sufficient means, and living some distance away from the city, I sent him to the city hospital where he was attended, as I was informed, by Dr. Renwick, but the patient became very low, and his parents were requested to take him home. I was again called to attend upon him. I then found that the hydatids had not only attacked the liver but also the lungs and kidneys. The patient was emaciated almost to a skeleton. I prescribed ol. terebinthina in fifteen min. doses, to be taken three times a day, although I did not believe that I would be able to benefit him to any great extent. However, after several weeks of this treatment, the hydatids disappeared, the patient recovered and is alive yet, and apparently strong and in a healthy condition since the last fifteen years.

Either of these cases I might be able to introduce to the meeting if desirable.

Discussion on Hydatid Disease, after the reading of the foregoing papers on the Subject of Hydatid Disease.

The Chairman (Dr. Gardner) said the question is now open for discussion.

Dr. Lendon : This, Mr. Chairman, is an appeal from the judgment given at the Congress in Melbourne by your predecessor in the Chair, Dr. Stirling. The appellants on this occasion are the Sydney school as represented by Drs. Sydney Jones and Scot Skirving. The defendants appear to be those principally of the Adelaide school, and, I suppose, we may add yourself, Mr. Chairman, to that number. On the previous occasion the counsel for the defendants were Dr. Davies Thomas and yourself. Your position in the Chair to-day prevents you siding with us, and we know that illness has unfortunately prevented Dr. Thomas from being present. It is principally of course from my intimate connection with that gentleman that I venture to make any remarks. What we (who may be called radicals on this occasion) say will perhaps be better represented by Dr. Verco's reply, and by what remarks Dr. Poulton may have to make. What we shall ask you to do is to issue a mandamus—I think that is the term—to prohibit Drs. Sydney Jones and Scot Skirving from using the needle, otherwise I am afraid they will not desist from their practice till they have killed some rich squatter. We say that our views were brought forward at last Congress, and that they have not been refuted. We take exception entirely to paragraph 2 of the joint summary by Drs. Sydney Jones and Scot Skirving, and we also take exception to paragraph 5; inasmuch, as we do not want an operation specially suitable for those not skilled in surgical matters, and we say that our mortality of 18 per cent., which is the mortality in all cases,—I know even yourself and your late colleagues at the Adelaide Hospital have not hesitated about operating on cases, they operate on all cases that present themselves,—therefore, the mortality of 18 per cent., and that is the highest mortality at present, is not high when compared with the mortality of such operations as phlebotomy in the early days, and removal of the uterus. We say further, that all that Drs. Sydney Jones and Scot Skirving prove is, that with cleanliness and antiseptic precautions less harm is done by their method than is done when these precautions are not used. And we contend, further, that with hospital statistics showing four deaths out of eighty-two cases treated, and with a percentage of twenty-two cases requiring our radical measures subsequently, they can hardly claim that they have met with success. I do not know whether Dr. Graham's paper was put up with the view of blessing or cursing the radicals, but I think that these pictures before us show that there is another danger in the method of aspiration. Of course, we know the fallacies of all statistics. Dr. Thomas' statistics show the average annual mortality under certain tables* to be 48 per cent. His cases included all the published cases from, I was going to say, time immemorial. I believe that these statistics are reliable as far as numbers are concerned, and I know that Dr. Thomas drew up his table from the original reports. The argument to-day should be narrowed down to this—what is the best operation for abdominal hydatids? The aspirators

* The table referred to was the first of those given in Dr. Thomas's opening paper, and before a general meeting of the second Congress held in Melbourne, when the question of hydatid disease was thoroughly gone into. The table quoted, gave the whole number of deaths due to hydatids in England and Wales from 1871-86 inclusive, as 476-762 out of 8,300,751, or 1 in about 11,000 cases.

have thrown overboard the lungs—I do not know what they prefer to do in thoracic-abdominal cases—but we have seen the most serious cases operated on, and I believe that before the next Congress meets they will have thrown over tapping the liver too.

The Chairman: It seems by almost unanimous consent that the question should be limited, if possible, to some definite issue, and probably the question of section versus aspiration is the one best calculated to serve the purpose we have in view. Much more good will be obtained by limiting the discussion the way proposed than by wandering over a wide field.

Dr. Verco (Adelaide): At the meeting in Melbourne, as Dr. Lendon has pointed out, those who pleaded for the radical method were yourself, Mr. Chairman, and Dr. Davies Thomas, of Adelaide. I kept quiet during the discussion of hydatids at the previous Congress, because my mind was not thoroughly made up, and I preferred to hear all the evidence that could be brought forward; and because there seemed a possibility of holding that one or the other method, tapping or incision, might be desirable in certain cases. But I have been trying to make up my mind since then, and I have to confess that I give in my complete adhesion to the operation by radical incision. I am glad to see that Drs. Sydney Jones and Scot Skirving allow that it is extremely undesirable to aspirate in cases of pulmonary hydatids, and when we put by the side of those statistics, which are favourable as regards tapping, the very unfavourable results as regards tapping in pulmonary cases, we must see that so far as pulmonary hydatids are concerned it is preferable to incise at once. And we should run less risk, if we came to the conclusion that we were probably dealing with pulmonary hydatids, to incise at once, cut out part of the rib, and then put in an aspirating needle, and prove what we are dealing with. There would be less liability of doing damage by that than by putting the needle in at first without incision. We are more liable to kill the patient by the latter method than by making an incision through the cavity. With regard to the statistics of tapping hydatids in the abdomen, it is a strange thing that the statistics from the Prince Alfred Hospital are a great deal more unsatisfactory than those from private sources, and it suggests the possibility of a fallacious system of statistics from private sources. Consequently, I think we ought rather to deal with the statistics that have come from a source about which we can be absolutely certain than with those which we cannot be so absolutely certain about. In dealing with the question of tapping or incision, the fact that there is a large percentage of cases that cannot be tapped has to be kept in mind. Out of nineteen cases that have come before me, seven were suppurating when first seen and had to be incised straightway. Out of eleven cases tapped four were cured. There is not the slightest doubt about the cure of hydatids by aspiration; three were not cured, and four cases were questionable. So far as my own experience is concerned, it is a very uncertain thing to tap. There is another thing, and that has scarcely been thoroughly brought out in Drs. Scot Skirving's and Jones' statistics with regard to the mortality by incision. In the nineteen cases referred to, seven were unfit for tapping, but these had to be incised; besides this, there were only two others which I incised, so that out of nine cases two only could have been tapped that were incised. Supposing you put the mortality statistics out of the question, you would have nine cases, seven of which were suppurating, one among the suppurating ones which should not have been tapped proving fatal. Among those which could have been tapped there were no deaths at all. If we eliminate every case that was suppurating at the time of operation, every case that indicated inflammation,

our mortality would be reduced to absolutely nothing. If you have a living hydatid in the liver, the best thing you can do is to incise it straight-way, and not wait till the patient dies. I have a long list of indictments against aspiration. Tapping an hydatid anywhere is a dangerous method of procedure, and whereas you may tell the patient that all he will feel will be the prick of a needle; you may very likely have to tell the patient's friends half an hour afterwards that the patient has died. In the next place, we cannot tell whether we are dealing with a simple cyst or not. We have to tap first, and then decide whether it is desirable to incise. In the next place, as it is impossible to empty daughter cysts, it leaves us uncertain, after tapping has been performed, whether we have one likely to be cured or not, and lastly it does not always cure the hydatid. I had one case of hydatids which I tapped by aspiration, there was a lump which was full of hydatid fluid, which had to be opened up and completely drained before it could get well. That is unsatisfactory as regards aspiration. In the next place if you tap by aspiration you cannot guarantee a cure, you can only say that it may cure; but if you incise you can say it will certainly cure the disease—whether it kills the patient or not is another question. However, inasmuch as the mortality from incision is smaller than from aspiration, you can at any rate tell the patient that he is less likely to die by having the radical operation performed than by resorting to tapping alone. If we could always have the patient under observation so as to see him periodically we might use our needle with a little more confidence than we do, but that is not often possible. The patient comes down from the country perhaps. After you have tapped him with a needle he goes home, and you do not know what has happened till months or years afterwards he comes back with his hydatids suppurated, and you realise you did the wrong thing by simply tapping him and letting him go home. In the second place, even after you have tapped an hydatid with an aspirating needle, although it may not suppurate it allows the hydatid frequently to live, and as it lives the fibrous capsule thickens and becomes more rigid, and when your patient comes down again from the country you conclude that you have not cured him with a needle, and you find that the parasite has undergone calcareous degeneration, that a cure will be much more difficult than it might have been if the proper treatment had been pursued in the first instance. In short we come to the conclusion that we should have incised at once. In the next place tapping by the needle is apt to mislead us. You find the place with a small needle and you come to the conclusion that you are dealing with a small hydatid. You aspirate, draw off only a drachm or two of fluid, and think you have done the work; whereas this small prominence on the surface of the liver screens a gigantic hydatid in the liver, and the patient comes back with a cyst which has suppurated. Consequently we conclude we ought to have incised it at first. That is about the number of indictments I have to bring against tapping by the needle. I may say that my views are not the result of a fanciful imagination, but are drawn from my own experience, and as a result of my study of the subject. I feel so persuaded of the efficacy of the radical treatment that if a patient comes to me with an hydatid which is incisable I advise him to undergo the radical operation at once.

Dr. Ellis (Sydney): I have had only a few cases myself at the Sydney Hospital, as I have only recently been appointed there. These have been treated by incision with no one disastrous result; all recovered. So far as I can see there is not a shadow of doubt that in all cases of hydatids incision is the proper method of treatment where you can get at the seat of the disease. I am firmly of opinion that the mortality will be next to nothing if tho

radical method is adopted. The mortality of the cases treated by incision is almost entirely due to the serious nature of many of the cases. Three of the surgeons in the Sydney Hospital are in favour of the immediate opening, and the fourth is in favour of tapping first and opening subsequently. There is not the slightest doubt in the minds of all four that the proper way to treat hydatids is by incision.

Dr. Bird (Melbourne): I do not wish to touch on more than one point in regard to this controversy, and that is that while aspiration has reached the limits of its utmost capabilities, and may be regarded as a perfected operation, the operation of incision has by no means been perfected. After a time I feel certain we shall empty the hydatid, one that has not suppurated, empty it perfectly, dry it perfectly, and shut it up perfectly, and the case will be done. Incision is only yet in its infancy, whilst aspiration has been perfected.

Dr. Graham (Sydney): I had not the privilege of attending the Congress the last time it was held in Melbourne, when this question was so very thoroughly and ably discussed, but when I read the report of the speeches in the Transactions I found that the gentlemen of the Adelaide school seemed to express the view which I had also formed after careful observation as to the mode of treatment of this particular disease. In the inquiry paper which Dr. Scot Skirving submitted to us, he referred to the long series of cases treated at the Prince Alfred Hospital, where the results by tapping compare very unfavourably with the results obtained by Dr. Jones himself. I should like to say that I had much to do with those cases, and I cannot blame myself for the very unsatisfactory results, because the method of treatment by tapping was carried out, so far as we could do it, in the most antiseptic way possible. When this was explained to our friends whose experience of the results from the method of tapping was different, we were told that the size of the needle had probably something to do with the want of success. I know of no case in the hospital in which a large needle was used where a small one would have served the purpose. But no matter whether the needle be large or small, it does not appear to me to alter the principle of the operation, for by aspiration we convert a living organism into a dead body, and, as Dr. Stirling has put it in his paper, we have, after the fluid has been removed by tapping, constantly before our mind's eye the fear of there being in the patient a dead structure that may, under adverse circumstances, assume an inflammatory character, and bring about awkward consequences. No patient should be said to be cured as long as a hideous foreign body, such as a dead hydatid with its wall, remains within him. So far as I have been able to watch the effects of the treatment in this disease I am thoroughly convinced that the method of operating by incision affords the very best chance to the patient for a complete recovery, and though my experience of tapping has not been as pleasant as it has been in the hands of some gentlemen, at all events it has been of such a kind as to impress me firmly with the view that the less we have to do with tapping the better. There are cases, no doubt, where tapping may be necessary—for example, in multiple cysts, where we cannot possibly treat by incision all the cysts; in such cases, tapping might be a sort of measure resorted to for want of a better. Aspiration, I think, has its right place after the incision is made and the cysts exposed; then we can safely apply our needle, and by drawing off some of the fluid produce an amount of "slack" in the cyst wall, which would render its subsequent opening free from the risk of leakage into the peritoneal cavity. I must say I feel rather surprised that Dr. Scot Skirving should insist on stating or thinking, as I know he does think, that the results

in the cases treated at the Prince Alfred Hospital by the method of tapping, which differ so strikingly from his, were brought about by any want of care or lack of due antiseptic precautions. I think the results were brought about by the method of tapping only.

Dr. Ryan (Melbourne): Had I been called upon to express an opinion at the time of the Melbourne Congress on the subject of hydatids, I should have ranged myself in favour of tapping. I have changed my ideas during the last three years, and chiefly because I have been one of those unfortunate ones who have had a fatal case. I have seen within the last two years one of the largest cases of hydatids I ever saw, which I aspirated five years ago, and which returned to me last year with a cyst refilled. I have had two other cases which I have tapped, and which have returned. I have operated on seventeen cases in a radical way; the results were not altogether satisfactory, since I lost three out of the seventeen cases. But even in these three cases I think if I could have operated on them again I could have saved their lives. In two of these cases a fatal result was due, I am inclined to think, to my unintentional negligence in the details of the operation. I can only say that I am a very strong advocate of those who go in for a radical operation. With regard to the staff of the Melbourne Hospital (with the exception of Dr. Fitzgerald, who advocates tapping) all are in favour of a radical operation.

Dr. William Chisholm (Sydney): I went to Melbourne in the firm belief that aspiration was the proper treatment. Since then I have had very much more experience. I was at that time charmed with the simplicity and ease of the tapping method, but I had not been in practice long enough to form any opinion as to whether it always brought about a cure. Since then I have seen a good deal more of the disease, and I give my adherence to the radical method. I have been rather exercised during the last fortnight as to the propriety of applying it to hydatids of the brain. I have operated on two cases. The first one—that of a child—occurred some time ago, and is mentioned in Dr. Graham's work. That was a large cyst, containing nearly a pint of fluid. The cyst was lying at the bottom of the cavity, and was extracted with ease. The patient only lived six hours after the operation. The temperature rose immediately after the operation, and just before death to 104. The child had convulsions just before death. A fortnight ago I had another case. I spoke to Dr. Fiaschi about it, and he came to the hospital with me, and the operation was performed in the presence also of Drs. Huxtable and Clubbe. The advisableness of treating the disease by drilling the skull and aspirating was discussed, but in the face of my previous experience I could not consent to that operation. Seeing how, in that instance, the cyst had so readily collapsed, and was seen lying loose in the cavity, I could not reconcile myself to leaving such a gross foreign body in the brain. I adopted a different method of evacuating the fluid. On this occasion I put in a very fine aspirating needle, and on drawing off hydatid fluid substituted a Southey's tube, with rubber tubing attached, and by drawing the child's head over the end of the table allowed 3 oz. to escape by a drop at a time. It then ceased to run. I thereupon made a very small incision through one-twelfth of an inch of brain substance to reach the cavity, and passed a fine rubber tube into this and evacuated the rest of the contents. In all, 19½ oz. of the fluid were evacuated, and the whole process took half-an-hour. I could not detach the cyst wall; I applied the forceps, but only small pieces broke away. At the suggestion of Dr. Clubbe I injected warm water into the cyst very gently. All our efforts to detach the cyst were unavailing. I stitched the dura mater with catgut and brought the cut edges of the scalp

together with silkworm gut and horsehair, and bandaged the whole thing up firmly, using no drainage. The temperature rose immediately after the operation, and the patient was quite conscious some three hours after. He said his head "felt very funny." The temperature continued to rise, and reached 106.2 before death, which occurred twenty-three hours after the commencement of the operation.

The Chairman : Might I ask you to shorten your speech, because it occurs to me, as the arbitrator, that it is absolutely unfair for everybody to get up and crush the originators of the discussion without allowing them the right of reply.

Dr. Doyle (Newcastle) : Might I say on behalf of the largest provincial hospital in New South Wales, that the practice of the surgeons at Newcastle Hospital is incision.

The Chairman : I will now call upon Dr. Scot Skirving or Dr. Sydney Jones to reply.

Dr. Sydney Jones : I may begin my remarks by stating that I think the results at which Dr. Scot Skirving and myself have finally arrived fully support the statements I made at the Melbourne Congress three years ago. I then distinctly affirmed my belief that aspiration or tapping in pulmonary hydatids should not be relied on—that it should be abandoned in favour of the radical operation. That statement we have repeated in this report. Owing to the anatomical structure of the lungs, and the risk of flooding the organ with hydatid fluid, we think that aspiration alone is unjustifiable. Notwithstanding that risk, our statistics show that a very large number of cases of pulmonary hydatids were absolutely cured by simple aspiratory tapping. I regret that in this discussion thoracic and abdominal cases have not been carefully distinguished. We have narrowed down our inquiry to the treatment of simple cysts in the abdomen. I also stated at the Melbourne Congress that a needle larger than one-sixteenth of an inch in diameter should not be used under any circumstances, and that full antiseptic precautions should be observed. The result of our inquiry goes to support the views I expressed in Melbourne. Out of sixty-six abdominal cases in which full antiseptic precautions were observed, and in which the needle employed was one-sixteenth of an inch or less in diameter, forty-four, or 66.6 per cent., recovered, and they were all free from tumour from one to sixteen years afterwards. The whole mortality of all the cases only amounted to 3 per cent., whereas the mortality recorded by Dr. Stirling, under the radical treatment, is 18 per cent. Even in the unfavourable statistics of the Prince Alfred Hospital the mortality is only 4.87 per cent., and we discarded those statistics because information as to the size of the needle and the antiseptic precautions observed was not forthcoming. We thought, in all honesty, it was right to speak of the operations performed there, but they do not fairly come within the limit of our inquiry. The reasons for insisting on a needle of one-sixteenth of an inch are very manifest; a large needle necessarily makes a considerable aperture in the cyst wall, and the chances of leakage and inflammation are immensely increased. With a very small needle there is not so much danger of leakage. The contraction of the cyst completely closes the aperture. In proof of that I repeat what I said in Melbourne, that in my own practice, where I have not used anything larger than a needle of the size named for many years, I have not seen a single case of urticaria. That is strong confirmatory evidence of the statement I have made that when a very small needle is used, leakage into the peritoneal cavity is a risk that need not be taken into consideration. The results of this inquiry confirm our conclusion that if the needle be of

the size recommended, and strict antiseptic precautions be observed, the risk of suppuration also is almost nil. And, if that be so, we contend that our patient, by being tapped, is in no worse condition for a radical operation if that should be ultimately required. Dr. Stirling's statistics give a mortality from tapping of 11 per cent., no distinction being drawn between thoracic and abdominal cases, and no regard being paid to the size of the needle employed. Of course we take it for granted that antiseptic precautions were used. But to the best of my recollection the two important points named above were not mentioned. Then as to the question of recurrence of a cyst. It appears to me that a very large number of men almost invariably conclude that because a swelling reappears at the site of the original puncture, therefore the cyst has refilled. This is not by any means a fair conclusion. *Post-mortem* examination has proved a shrinkage and collapse of the old cyst, and that a new cyst has pushed forward and occupied exactly the same site as was occupied by the first cyst. Therefore, I protest against it being invariably concluded that because a swelling reappears at the site of the puncture the cyst has refilled.

Dr. Graham: A single hydatid cyst occurring in the liver is the rule, not the exception.

Dr. Sydney Jones: There are many exceptions to it. This is a point which I am inclined to think our younger surgical brethren treat very lightly—I mean the apparent refilling of the cyst. It is said that, in the majority of cases, the cyst refills. It is true that in many cases, after several days—in fact, sometimes after several weeks and even months—you will find almost as large a swelling as before you tapped; but this will generally be found to be an effusion of serum, and not a collection of hydatid fluid. It is an effusion of serum into the cyst, and if you wait the swelling will entirely disappear. A large number of our surgical brethren, however, who, perhaps, very naturally, prefer the heroic method, would conclude in such a case that the tapping had done no good whatever, and that it was their imperative duty to at once resort to the radical operation. I beg my younger brethren to have a little patience, and if there should be no urgent symptoms to wait before proceeding to incision. If there be any evidence of suppuration having followed the tapping, then, I say, proceed with the radical operation; but I contend that unless this distinctly shows itself it is our duty to wait. I have seen cases in which the swelling, three days after tapping, was apparently quite as large as before I tapped. I have seen that patient again, two months after, when not a sign of tumour was to be observed, and that has been a not infrequent experience.

The Chairman: My position here to-day prevents me from descending into the arena and joining in the fight. I regret it; but I may at once draw your attention to the time, four years ago, when I stood up the almost friendless advocate of the method which now seems to be in the majority—the method of section. But I am bound to say that the divergence of opinion to-day on the subject of hydatid section *versus* aspiration is nothing like so wide and marked as it was four years ago. The subject has, in my opinion, been narrowed down to this simple question—whether aspiration or simple incision into the living cyst must be done. Drs. Sydney Jones and Scot Skirving are agreed that every suppurating cyst must be subjected to the knife, and every cyst, with daughter-cysts, must be subjected to the knife; and every pulmonary cyst must be subjected to the knife. The question, therefore, is—shall we use the knife or the needle in simple hydatid cysts in the liver? With regard to the size of the needle, to which such strong reference has been made, I cannot see that it makes any difference except

as to the drainage into the peritoneal cavity. It matters not whether the needle is the size of your little finger or of your thigh, but it does matter as to the drainage of the cyst into the peritoneal cavity. On this point, at any rate, Drs. Jones and Scot Skirving and I are at one. Those who hold that aseptic incision is devoid of danger, and those who hold that simple aspiration with an antiseptic needle is devoid of danger, are absolutely agreed, so far, at any rate, as regards the advisability of sectional treatment in suppurating and some other exceptional cases. I think the whole discussion shows that there is, after all, very little divergence of opinion between us. We will leave Drs. Jones and Scot Skirving to use their aseptic needles successfully in simple cases, and those young men, to whom the President referred, and amongst them, notwithstanding my grey hair, I would like to rank, may be left to make their aseptic incisions, and at the next Congress the young men, without the grey hairs, will be able to shake hands with the old men with the grey hairs, and say "There is very little difference between us."

This terminated the discussion.

Exhibits of Casts of two Cases of Club Foot, Talipes Equinus, and Talipes Varus.

FREDERICK MILFORD, M.D., Heidelberg et Syd.; M.R.C.S., Eng.; L.R.C.P., Lond.

THE four casts I present for your inspection are representations of two cases of club foot now under my care; as I believe cases in the adult are rarely surgically treated, I think the success which has attended the treatment of these cases may prove interesting, as the deformity was great in both, and be encouraging to others, both patients and surgeons.

Case 1.—Mr. J. A., aged 30, a new arrival in the colony, when about 3 years old acquired talipes equinus with partial paralysis of the extensor longus digitorum of the right foot; he was in various public institutions in England for surgical treatment, but after arrival here he came under my care early in August of this year. On 9th August, assisted by Dr. Marano, I divided the tendo achillis; a Scarpa's shoe was made for him by Mr. McLennan, and he wore this for about a fortnight, when finding the second, third, fourth, and little toe getting more flexed the more the heel was brought down, I divided the tendons of the flexor communis digitorum in the toes. I have been perfectly successful with regard to the three middle toes, which are quite straight and movable at the will of the patient, but have not been so much so with the little toe, and purpose another division of the tendon of the flexor longus digitorum in this toe, that of flexor brevis digitorum and that of flexor brevis minimi digiti. This patient has been under treatment just seven weeks, and a few days since walked during two hours a distance of about three miles with the aid of a stick. He wears a boot with a high heel as the limb is $1\frac{1}{2}$ inches shorter than his other leg, this has a steel support on the outer side.

Case 2.—Miss J. S., aged 17 years; was about 4 years old when she was seen to drag the foot along instead of lifting it off the ground, and has since suffered from talipes varus. She was taken to the Infirmary and to many practitioners, and the limb got progressively worse until she was unable to walk, although several boots were made for her; at the time I first saw her in May last, she had not been outside the house for three years, except for a few steps in the street where she lives at night time. On 20th June, assisted by Dr. Marano, I divided the tibialis posticus, tibialis anticus, and plantar fascia; after which she wore a Scarpa's shoe, and on 10th July, I divided the tendo achillis. Her heel is now down on the ground and the foot permanently at a right angle with the leg, while the tendency to turning in of the foot and toes (the varus) is all but completely overcome.

The casts as well as the instruments, Scarpa's shoes and Little's boots, were made by Mr. McLennan of this city. I have had the accompanying photographs taken from the casts. The casts are in the possession of the Lecturer in Surgery at the University.



CASE I.

CASE II.

To illustrate Dr. Milford's cases of Talipes.

SUB-SECTION.

DISEASES OF THE NOSE, THROAT, AND EAR.

Post-nasal Growths.

JAMES W. BARRETT, M.D., M.S., Melb., F.R.C.S., Eng.; and PERCY WEBSTER, M.D.,
Durh., M.R.C.S., Eng., L.R.C.P., Lond.

THE writers have been induced to make this communication, believing that in spite of the voluminous (periodical) literature on the subject, much information is still wanted about it. It appears to them further that post-nasal growths are responsible in Australia for a vast amount of general disease, and that the affection is the chief cause of deafness at all periods of life. That is to say the larger number of cases of deafness begin in early life, and the cause of deafness in early life is almost invariably post-nasal growths. This paper is based upon an experience of many hundreds of cases. Of these the notes of about 200 are sufficiently accurate for purposes of general analysis, and an additional nineteen have been selected for purposes of detailed examination. It is unfortunately difficult, in dealing with a disease of this character, to discuss it in a strictly logical manner. The treatment is in the main inductive (the data referred to serving as a basis). One preliminary caution is needful. Patients suffering from this disease almost always seek relief for deafness. The general public, and many members of the profession in general practice, are not yet fully alive to the danger run by mouth-breathers, and mouth-breathers themselves only seek advice when they become ill, or suffer from obvious deafness.

In the first instance, then, we desire to present the facts ascertained by the analysis of the 200 cases. Of the 200, 110 were males and 90 females. The average age—males, 9.47, females, 9.05.

Numbers in quinquennial periods:—

	Males.	Females.
Under 5 years	10	0
5 to 10 "	51	50
10 to 15 "	25	30
15 to 20 "	7	7
20 to 25 "	5	0
25 to 30 "	3	0
30 to 35 "	2	1
35 to 40 "	1	0

The age mentioned in each case is that of the patient at the date of first consultation. Of these 200 cases, 38 were suffering from chronic suppurative inflammation of the middle ear, on one or both sides. The symptoms put in the order of frequency with which they were complained of, were:—(1) deafness; (2) ear-ache; and (3) heavy breathing.

By heavy breathing is meant, we think, the peculiar noisy breathing of those who respire through the mouth. Other symptoms were elicited only on examination. The cause of the deafness was generally ascribed by the parents to frequent colds, and in many cases to whooping-cough. Very few were able to fix the date at which the deafness began; but in twenty-five cases the symptoms had lasted—under three months in four cases, three to six months in two cases, six months to one year in four cases, one to two years in six cases, two to five years in five cases, over five years in four cases.

In twenty-one cases the average age at which the symptoms began was 5·5 years. With patients over 10 years, it was generally stated they had been deaf for many years.

The following table shows the way in which we have arrived at the conclusion that the average age at which the disease began was 5·5 years:—

No.	Age.	Duration.	Probable age at which Disease commenced.	No.	Age.	Duration.	Probable age at which Disease commenced.
1	5	4 years	1	14	6	12 months	5
2	10	4 „	6	15	14	Some years	...
3	3	1 „	2	16	11	Many years	...
4	8	5 months ..	3	17	15	„	...
5	5	12 „	4	18	9	6 years	3
6	6	18 „	4·5	19	10	3 „	7
7	5	12 „	4	20	15	12 „	3
8	7	1 month	7	21	10	4 „	6
9	15	Many years	...	22	4	2 „	2
10	10	3 years	7	23	9	3 „	6
11	6	3 weeks	6	24	19	6 „	13
12	9	3 years	6	25	15	11 „	11
13	10	9 months	9				115·5

Which gives the average age at which the disease began for twenty-one cases as 5·5. The analysis of the nineteen cases referred to, and which are given in full in connection with this paper, gave the following information:—

(I.) ORAL, NASAL, AND OTHER SYMPTOMS.

Fifteen were mouth-breathers, thirteen had enlarged tonsils, only nine suffered from anterior nasal obstruction caused by chronic rhinitis.

(II.) GENERAL CONDITION.

Thirteen suffered from debility to a marked degree, and are variously described as ill-nourished, anæmic, strumous-looking, dull, awkward, flabby-looking, vitality deficient or pinched, and delicate in appearance; the prevailing characteristic being want of tone. Although many of the cases are described as being strumous in appearance we cannot recollect seeing one case of marked post-nasal growths in which there were gross strumous lesions, and in passing we may say that we think it quite possible that the strumous face so-called is really the mouth-breather's face. Four cases seem to have enjoyed good health. Several are described as suffering from frequent colds. The palate was high and narrow in six cases; high and broad in four cases; arched but not markedly high in one; fairly normal in four; and narrow and arched in one case. The membrana tympani was normal and the hearing normal in two cases. It was depressed and catarrhal, or showed signs of former catarrh, in fifteen of the cases, and in two there was, or had been, suppurative catarrh.

Hearing before operation.	Hearing after operation. Time after operation stated.
1 Very deaf.....	4 months, $\frac{1}{8}$ R, $\frac{1}{8}$ L.
2 $\frac{1}{10}$ R, $\frac{1}{20}$ L	2 months, much improved.
3 Very deaf.....	Much improved.
4 $\frac{1}{8}$ R, L normal.....	3 months, normal R and L.
5 $\frac{1}{10}$ R, $\frac{1}{2}$ L	3 months, normal R and L.
6 $\frac{1}{8}$ R, $\frac{1}{2}$ L	3 months, nearly normal R and L.
7 $\frac{1}{10}$ R, $\frac{1}{20}$ L	$\frac{7}{10}$ R, $\frac{1}{20}$ L.
8 $\frac{1}{8}$ R, $\frac{1}{10}$ L	No deafness noticeable.
9 $\frac{1}{20}$ R, $\frac{1}{20}$ L	5 months, $\frac{1}{8}$ R, $\frac{1}{8}$ L.
10 $\frac{1}{10}$ R, $\frac{1}{10}$ L	5 months, $\frac{1}{2}$ R, $\frac{1}{2}$ L.
11 $\frac{1}{6}$ R, $\frac{1}{2}$ L	1 month, $\frac{1}{2}$ R, L normal.
12 Contact R and L	3 weeks, R nearly normal, $\frac{1}{2}$ L.
13 $\frac{1}{10}$ R, $\frac{3}{4}$ L	$\frac{1}{10}$ R, L normal. Suppuration right ear.
14 $\frac{1}{2}$ R, $\frac{1}{12}$ L	7 days. $\frac{1}{2}$ R, contact L. Subsequent observations not obtainable.
15 Contact R, L normal	2 months, $\frac{1}{10}$ R, L normal.
16 $\frac{1}{10}$ R, $\frac{1}{20}$ L	4 months, $\frac{1}{2}$ R, $\frac{1}{2}$ L.
17 Normal R, contact L	10 days, L normal.

It will be seen, therefore, that in severe cases normal hearing is rarely restored. In addition, in almost every case the improvement in general health was most remarkable. Within a few days the patients became better, the relaxed condition of the facial muscles disappeared, and colour returned to the cheeks. One of the elder patients on the list described the result as being wonderful.

The operation has in the last few hundred cases been uniform. The growths have been removed with the middle finger, with the exception of those growths which, depending from the roof of the pharynx, project into the posterior nares, and which cannot well be so removed. These we have removed by passing through the anterior nares a long-handled eurette. When the eurette reaches the pharynx it is received on the point of a finger of the other hand and guided to effect the necessary removal. We now adopt a uniform procedure in removing growths with the finger. The finger-nail is passed from side to side from the roof of the pharynx down to the level of the edge of the palate, so as to completely clear the posterior wall. We then remove any growths found in the fossæ of Rosenmüller, then carefully examine the Eustachian orifice with the finger and remove any thickened tissue round the circumference of the promontory. We have never yet found any growth on the promontory itself. With the back of the finger-nail any growth on the roof of the pharynx which projects into the posterior nares can then be removed. Finally, we make certain that the posterior nares themselves are clear. This is the only part of the removal which cannot always be performed with the finger. To complete it the use of the eurette just referred to is required.

In our earlier cases we used the cutting forceps, the ring knife, and other instruments, but gradually discarded them for the means now adopted, which seem to be very much more efficient. Difficulty sometimes arises in removing the growths from persons over or about the age of 12 years. They are then apt to be tough and fibrous, but we have always succeeded in the manner described. We employ a general anæsthetic or not, according to the patient, but with the ordinary method given can remove the growths from the nasopharynx of a child with just as much certainty without an anæsthetic as with it. When an anæsthetic is used it is never pushed to anything like the stage of full anæsthesia. The only signs of danger ever seen have been where the growths have been removed from patients who were profoundly under the influence of chloroform. It does not seem, apart from chloroform, that any serious accidents or unfavourable results have ever followed this operation, though Dr. Iredell informs me that in one case—an adult—there

was most alarming hæmorrhage, which fortunately ceased spontaneously. We have never seen anything analogous to the hæmorrhage which sometimes follows the removal of tonsils. It is hardly necessary to add that wherever the tonsils were hypertrophied they were removed subsequent to, prior to, or at the time of the removal of the post-nasal growths.

It seems to us that sufficient attention has not been given to the after treatment. The removal of the growths really represent the first important item of treatment. For the week following the operation the use of a bicarbonate of soda douche is required. After the week the case must be treated as one of post-nasal catarrh or chronic rhinitis, as the case may be, and managed in the ordinary way. It is unnecessary to occupy space by repeating familiar detail. After all necessary surgical procedures we usually send the patients inland for change of air.

CAUSATION.

Children who suffer from post-nasal growths are frequently those who have suffered from whooping-cough, scarlet fever, measles, diphtheria, or frequent colds. What is the causal relationship between these essential causes and the growths? Recognising in post-nasal growths nothing more than the enlargement of the adenoid tissue normally met with in the naso-pharynx, the problem reduces itself into an inquiry into the possible causes of such enlargement. That children at or about the second dentition are strongly predisposed to lymphoid enlargements is sufficiently obvious from the frequency of enlarged tonsils and glands elsewhere, and it is not difficult to understand that any of the foregoing ailments might readily cause enlargement of the adenoid tissue in the naso-pharynx. This simple explanation of enlargement as a result of local irritation to be complete obviously requires the existence of some such special liability to adenoid enlargement since similar conditions occurring later in life do not give rise to anything like the same enlargement. It is, however, quite a mistake to suppose that they give rise to no enlargement. Even in adults, a succession of severe colds or attacks of influenza may produce considerable enlargement of tissue in the post-nasal space. Greville MacDonald has elaborated a most ingenious theory to account for the existence of post-nasal growths. Briefly put, it seems to be as follows:—That there is in these cases an anterior nasal stenosis causing obstruction to nasal respiration. That in consequence of this the barometric pressure in the naso-pharynx is lowered to a greater extent during respiration than normally, and so that this anterior nasal stenosis causes hyperæmia of the naso-pharynx; consequently, at the age of second dentition, enlarged tonsils and post-nasal growths are met with. Looked at from this point of view, the cause of the growths previously referred to may serve simply as the cause of an anterior nasal stenosis, antecedent to the growths. MacDonald, in support of his theory, refers to the fact that there is generally some rhinitis in these cases, and that the anterior part of the nose frequently wants treatment after the removal of the growths. We cannot say that our experience confirms these statements absolutely. It is perfectly true that in bad cases of post-nasal growths there is chronic rhinitis, and very frequently anterior nasal obstruction, but it is also true that the removal of the growths in the great majority of cases puts an end to both the rhinitis and anterior nasal obstruction. Since reading his explanation, we have further been careful to examine the nares in every case of post-nasal growths, with the result that we found a considerable minority in which there was no rhinitis and no anterior obstruction whatever. Of course, it is quite open to reply that the antecedent nasal obstruction had disappeared,

but that is not at all probable. If the cases were one or two in number such an explanation might hold good, but not when they can be counted by scores. Consequently, we fail to recognise in Greville MacDonald's theory anything like a complete explanation of the causation of post-nasal growths. That it is a factor in their development seems probable, but whether an important or unimportant one remains to be seen. For us the vulnerability of the child at the age referred to, and the existence of severe local irritation, is sufficient in the main to account for their existence. They are very abundant indeed in Melbourne, that is in the southern part of Victoria, but, unfortunately, we have no figures to enable us to estimate their relative frequency near the coast and inland. Our impression is that they are very much less frequent north of the Dividing Range—an impression further supported by the rapid improvement produced in cases of nasal catarrh by a change to that district. There seems little doubt that the high-arched palate is frequently associated with the presence of these growths. What the relationship is we have no means of determining. It seems further impossible to decide why enlarged tonsils should be met with in some of the cases and not in others. It is, however, worth noting, that we have observed marked improvement follow removal of tonsils in bad cases of post-nasal catarrh. The explanation we hope to give at another time and place.

SYMPTOMS.

These must be divided into two groups—aural and general. The aural symptoms have been fully described so frequently that it is unnecessary to repeat them in detail. The general conditions seem to be Eustachian obstruction, then repeated attacks of acute inflammation of the middle ear, followed in a large percentage of cases by abscess and perforation. The attacks extend over many years, and if untreated, end about puberty in sclerosis and ultimate deafness. We are strongly of opinion that post-nasal growths are the cause of all deafness met with, and that the number of persons who suffer from deafness contracted entirely in adult life is relatively small. It seems that many people do not recognise deafness until the hearing is reduced to one-tenth of the normal, and it frequently takes the period of time elapsing between the appearance of these growths and puberty to reduce the hearing permanently to that point. Thus it is that patients frequently do not seek advice until the acute inflammation has passed and sclerosis is well advanced. The hearing continues slowly to deteriorate, and at 25 years of age the deafness is pronounced. By this time probably no trace of the growths remains except the post-nasal catarrh. For there seem to be good grounds for the suspicion that persistent post-nasal catarrh in adult life is the consequent of post-nasal growths in early life. The exact cause of the middle ear inflammation is not quite obvious. It would appear to be an extension of the chronic inflammation that accompanies the post-nasal hypertrophy along the Eustachian tube. The rapid and startling improvement which sometimes follows removal forces us to hesitate before accepting such an explanation absolutely. It might be that in these cases the element of Eustachian obstruction was more prominent than usual, but of this we have found no objective evidence.

GENERAL SYMPTOMS.

As to the casual relationship of a number of general symptoms to the existence of post-nasal growths, there is no doubt the chief symptoms are those depending upon imperfect nasal respiration. In spite of the nasal obstruction produced by the growths there seems to be no doubt that patients always endeavour to breathe through the nose, probably in accord

with ancestral nervous habits, and it is in very few cases that one finds absolute nasal obstruction, even where buccal respiration is most pronounced. The strain put on the thoracic muscles by the effort to draw air through the narrowed nose may account for much of the exhaustion and for the physical thoracic symptoms. It is to us quite inconceivable that in total buccal breathing there can be much strain on the respiratory muscles. The strain must result from continued attempts to restore nasal respiration. The buccal respiration however, accounts for the bronchitis and for the laryngeal troubles to which these children are subject. In several cases we have seen a marked liability to laryngeal catarrh diminished in a great degree by their removal. The respiratory trouble, the deformity of the chest, the bronchitis (possibly the arching of the palate), the general debility, and anæmia seem to be readily explained in this way. There seems good reason for believing that mouth breathers do not aerate their blood efficiently. During eating or speaking they are always in difficulty, but even during sleep they do not get on comfortably. Children turn uneasily on the pillow, become restless, and finally wake up in a condition of mild delirium. The probable explanation of this disturbed sleep would seem to be the inevitable tendency of the respiratory centre to induce nasal breathing in accordance with ancestral habit. Consequent imperfect aeration, deficient oxygenation of the centre, of the nervous system in general, then a mild convulsion, to be re-followed by mouth-breathing, and a fresh cycle. The symptoms enumerated, interference with speech, deglutition, aeration, and the respiratory movements, coupled with the disturbance of sleep, seem to us sufficient to account for all the general symptoms produced by post-nasal growths. Children suffering from these growths have frequently what is called a strumous appearance. They further frequently possess enlarged cervical glands, but we have not met with one case in which the gross lesions of struma have co-existed with them.

In the Guy's Hospital reports for 1881 there appears a paper by Francis Galton and F. A. Mahomed, entitled "An Inquiry into the Physiognomy of Phthisis by the method of composite portraiture." With the paper are exhibited a large number of portraits of faces, of different types, grouped according to their obvious affinities. Figure 47 and its components are placed here together as exhibiting strumous features. *All have the open mouth*, a short upper lip, and a broad nose, with more or less depressed bridge, yet the outlines of the face are narrow, rather than broad. The authors mean to say that these five faces and the composite would be pronounced by everyone as strumous, yet they lack the broad outline to the face which has been stated to be one of the characteristics of a strumous frame, as the ovoid outline is stated to be of the tubercular frame. The authors conclude that there is no special type of face associated with phthisis.

And our contention is that the so-called strumous features are frequently the result of nasal obstruction.

CONCLUSION.

We may sum up by stating that in Australia this enlargement of the adenoid tissue of the naso-pharynx is the chief cause of aural disease at all ages—a disease which is very common, and which is probably as amenable to treatment, and with as little danger, as any serious ailment that can be mentioned. With the early recognition and treatment which will follow diffused knowledge, we may confidently look to the marked diminution of cases of serious deafness in adult life, and we may further look for the production of more sturdy individuals.

POST-NASAL GROWTHS. (*Drs. Barrett and Webster.*)

Sex.	Age.	Ear disease.	Duration.	Oral, nasal, and other symptoms.	General health.	Features.	Palate.	Membranes.	Hearing.	Operation.	Result.
M.	5 years	*C.S.C.M.E., R. and L.	4 years ..	Snore, Oral respiration, Chr. Rhinitis. Enlarged tonsils.	Ill-nourished; anemic. Strumous looking. Enlarged glands.	Thin, stunted.	Arched ..	Perforated	Very deaf..	25/1/92	14/3/92.—R. 24; L. 19. Much brighter and healthier. 29/5/92. —R. 25 in.; L. 25 in. Not snore. Nasal respiration. 19/3/92.—Hearing much improved. Healthy, bright look, with supple, healthy skin. Lost to a large extent the strumous look.
F.	10	C.C.M.E., R. and L.	4 years ..	Snore, Oral respiration. Dead voice. Rhinitis.	Ill-nourished. Dull, awkward, flabby. Thick eczematous skin. strumous.	Thick and gross.	Not arched	Catarrhal and depressed.	R. 2 in. L. 4 in.	20/1/92	
F.	3	C.S.C.M.E. & C.C.M.E.	1 year	Breathing heavy. Large tonsils.	Anemic. Ill- nourished. A strumous look.	Thick	High, arched, and broad.	Partially destroyed.	Very deaf..	21/1/92	Much improved for a time. It- curred and removed. 22/6/92.— Membr. healed. Very slightly deaf. Lost strumous look, and gained a fresh, healthy com- plexion. 4/1/92.—H. = n., R. and L.
M.	13	C.C.M.E., R.	.....	Large tonsils	Healthy and strong	Gross. Strumous.	Normal ..	(?) Normal	R. 25 in. L. = n.	22/1/92	
M.	8	C.C.M.E., R. and L.	5 months	Pharyng. catarrh. Nasal obstruction. Tonsillitis. Enlarged cervical glands	Strumous, but vigorous. Subject to colds.	Strumous.	Normal ..	Catarrhal and depressed.	R. 2 in. L. 36 in.	5/2/92	20/5/92.—H. = n., R. and L. General health and aspect much improved.
F.	6	C.C.M.E.	.....	Not noticed to be deaf, but ear-ache 5 weeks. Large tonsils.	Ill-nourished and flabby. Constantly having colds.	.....	High and broad.	Rcd. Ae. Cat. M.E.	R. 30 in. L. 35 in.	5/2/92	20/5/92.—Mls. depressed, red. Fresh attack of Sub. Ac. C.M.E. H. nearly normal.
F.	16	C.C.M.E.	.....	Chr. Rhinitis. L. nostril obstructed.	.....	.....	Normal. Broad and low.	Depressed and scarred.	R. 5 in. L. 1 in.	....	20/7/92.—R. 14 in.; L. 1 in. Membr. depressed.
F.	5	C.C.M.E.	12 months	Ear-ache and deaf. Snore, and sleeps badly. Enlarged tonsils.	Pale, delicate, refined, intelligent. Constantly having colds.	.....	.....	Red, depressed, scarred.	R. 10 in. L. 5 in.	9/3/92	S/S/92.—Not noticed to be deaf. Much brighter, sleeps better. does not snore, appetite im- proved, and not as subject to colds.
F.	6	C.C.M.E.	13 months	Nasal obstruction. Open mouth. Snoring. Oral respiration. Tonsils large.	Delicate. Enlarged cervical glands.	Stupid expression, mouth open, and nose pinched.	High, but broad.	Red and sunken.	R. 4 in. L. 4 in.	21/2/92	18/8/92.—R. 10 in.; L. 10 in. Redness gone. Better health. Not stuffed up. More free. Lost stupid look.

* Chronic suppurative catarrh middle ear.

† Chronic catarrh middle ear.

POST-NASAL GROWTHS—continued. (Dr. Barrett and Webster.)

Sex.	Age.	Ear disease.	Duration.	Oral, nasal, and other symptoms.	General health.	Features.	Palate.	Membranes.	Hearing.	Operation.	Result.
F.	15 years	C.C.M.E., R. and L.	18 months or more.	Ch. H. Rhinitis. Shores. Dead voice.	Lacks vitality, pale	Vacant expression, mouth open.	.....	Depressed and opaque.	R. 8 in. L. 5 in.	23/2/92	Immediate benefit. 22/3/92.—R. 12 in. L. 16 in. Snores still. Rhinitis the same. Brighter and better in health. Head feels clearer. 19/7/92.—R. 12 in.; L. 25 in. 25/4/92.—R. 36 in.; L. = n. Second operation. Much improved in health. Parents do not notice any deafness.
M.	5	C.C.M.E., R. and L.	12 months	Shores	.....	.....	.....	Red and sunken a little.	R. 15 in. L. 12 in.	23/3/92	26/4/92.—R. nearly normal; L. 20 in. Redness gone. 13/7/92.—Fresh Ac. C.M.E. R. H. = 20 in.; L. = 26 ins. 16/8/92. R. $\frac{1}{2}$ in.; L. 89 in. R. memb. healing; General health greatly improved. Brighter, more active, and robust. Ch. Rhin. and pain in head better. 22/7/92.—H. = n. Memb. = n. Does not snore. Cough and Rhinitis better. Tonsils removed.
F.	7	Sub. Ac. C.M.E., R. and L.	1 month..	Ear-ache and restless- ness. Nose free. Throat cough.	Delicate .....	.....	.....	Sunken and red.	Contact R. and L.	5/4/92	13/7/92.—R. 36; L. contact. Brighter since operation, but still snores, and is restless.
M.	15	C.S. C.M.E., R.	Many years.	Chr. Hyp. Rhinitis. Pains in forehead. Great hypertrophy of Inf. Turbinates. Oral respiration.	Anæmic, strumous looking. Enlarged tonsils. Dull, heavy look.	Strumous..	High and arched, and narrow.	R. destroyed L. depressed	R. 5 in. L. 69 in.	30/5/92	8/8/92.—H. = n. Does not snore. Lost snuffing. More lively. Sleeps better. Red memb. gone.
F.	10	Sub. Ac. C.M.E.	3 years ..	Shores. Throat cough. Subject to colds, Chr. Rhinitis. Enlarged tonsils. Tinea Tarsi.	Strumous aspect. Lively. Enlarged cervical glands.	Long oval face. Thick lips.	High, arched, and narrow.	.....	.....	17/9/92	25/7/92.—R. 14 in.; L. = n. Great improvement. Does not snore. Better health. Membranes a little sunken.
M.	6	Sub. Ac. C.M.E.	Pain 3 weeks.	Shores. Very restless. Large tonsils.	Delicate. Very strumous. Enlarged cervical glands.	Broad nose, thick ala.	High and arched.	Depressed and red.	R. 36 in. L. 6 in.	6/7/92	8/9/92.—R. 14 in.; L. = n. Great improvement. Does not snore. Better health. Membranes a little sunken.
M.	9	C.C.M.E.	3 years ..	Ear-ache. Shores. Chr. Rhinitis. Enlarged tonsils.	Delicate since whooping cough, when symptoms began.	.....	High, arched, and narrow.	Sunken and red.	.....	25/7/92	8/9/92.—R. 14 in.; L. = n. Great improvement. Does not snore. Better health. Membranes a little sunken.
M.	10	C.C.M.E.	9 months	Shores. Oral breathing. Enlarged tonsils.	Looks strong and healthy. Cervical glands enlarged.	Narrow and arched.	.....	R. contact. L. = n. (?)	R. 8 in. L. 4 in.	25/7/92	8/9/92.—R. = 40 in.; L. = 25 in. Membs. not red. Does not snore. Breathes through nose.
F.	6	C.C.M.E.	12 months	Shores. Nasal obstruc- tion. Enlarged tonsils.	Delicate. Enlarged cervical glands.	Well formed narrow.	High and narrow.	Sunken and red.	R. 8 in. L. 4 in.	6/5/92	Ten days later H. L. = n. Does not snore. Feels lighter in head. Describes the change as wonderful.
F.	14	C.C.M.E., L.	Some years	Chr. Rhinitis. Always having colds. Shores.	In good health, but feels heavy about head. Not strumous.	Well formed broad.	High and broad.	L. sunken a little.	L. contact. R. = n.	19/8/92	

Nasal Disease as a causal factor in Affections of Adjacent Parts and Distant Organs.

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It is not my intention in this paper to put forward my own opinions so much as to elicit those of my professional brethren, many of whom, no doubt, have a much more extensive experience of the subject than has fallen to my lot; still I desire to draw attention to some of the clinical details, the observance of which may be of use in bringing about a successful result, and their neglect, on the other hand, may possibly account for some of the failures. It is only within the last few years that the study of diseases of the nose has taken the important place in clinical medicine which it deserves, and which has led to the successful treatment of organs at a distance, with some of which it cannot be said to have any anatomical connection. Indeed, so fully is the importance of the matter recognised on the continent, that most physicians send their chest, ear, and other cases, to a nose and throat specialist, to obtain his opinion as an aid to diagnosis.

Laryngologists commonly refer to the nose as an originating factor in affections of the larynx; and even oculists have recorded the cure of eye diseases by nasal treatment. Guye, of Amsterdam, particularly records a case of follicular conjunctivitis sent him by Professor Snellen, and a cure resulting after removal of pharyngeal adenoids, as had been prognosticated. Here it may be desirable to allude to the physiological functions of the nose as a *respiratory organ*, a fact which, having been comparatively recently discovered, may not be generally known, and which must be considerably useful to us in considering its diseases. Vierordt, in 1845, mentioned the fact of the air being raised in temperature in passing through the nose. In 1864, Nestor Grehan concluded that *expired air* was warmed to blood heat, and saturated at a temperature of 95° F. In 1880, Rosenthal claimed that the air was warmed and saturated by the time it reaches the alveoli; but the credit of solving the problem, by well-conducted physiological experiments, belongs to Aschenbrandt, of Würzburg, in the year 1886. His results were fully confirmed shortly after by Kayser and by Greville M'Donald, in 1889. They arrived at these conclusions:—

- 1st. The air in passing through the nose is raised to blood heat by the time it reaches the pharynx independently of the external atmospheric temperature.
- 2nd. The inspired air after passing through the nose is completely saturated with moisture. This takes place through the serous exhalation given off by the cavernous or erectile tissue, amounting in normal respiration to 7715 grains, or 16 oz., according to Aschenbrandt; the process is controlled by vaso-motor influence, and is thus nicely regulated under the varying and sudden alterations taking place in the surrounding atmosphere.
- 3rd. An interchange of gases also takes place, carbonic acid being given off from the blood in the nasal mucous membrane, estimated roughly at 1.50 of that given off by the lungs, and varying with the temperature to which the air is raised. The increase in the supply of heat is probably due to increased conduction, radiation, &c., of heat from the augmented blood supply to the mucous membrane, and partly by direct increase of oxidation in that and the adjacent structures.

When we think of these results, we cannot but be struck with the importance of the respiratory functions of the nose; performing, as the latter does, half or more than half of the work for which we formerly gave the lungs credit. The principal rôle, as we have seen, is played by the cavernous or erectile tissue of the middle and lower turbinated bones, and indeed, some authors have been so convinced of its importance as to trace a vaso-motor connection between this tissue and the corpus cavernosum penis, causing crethism in the lower animals. At any rate it is from this tissue that our respiration is daily supplied with 16 oz. of water for saturation purposes, and we can easily see the irritating and injurious effects when this supply is deficient or abolished, in the diseases of the larynx, bronchi, and air cells, incident to being robbed of their natural moisture, for which there is no alternative provision. The irritating effects of inhaling cold dry unfiltered air are obvious.

Let us now briefly glance at the effects in the first place of *Mechanical Obstruction* with its necessary attendant evil, *Oral Breathing*. Under this heading we have tumours, hypertrophic rhinitis, septal deviations, &c., &c., and as a result of the rarefaction of the air behind the obstruction, congestion, oedema, and a chronic catarrh of the various tissues leading locally to the formation of adenoids, retronasal catarrh, tonsillitis, pharyngitis, laryngitis, lung diseases, and so on. In the same way such affections of the eye, as epiphora, granular lids, corneal ulcer, and even glaucoma (Bronner, of Bradford, and Cheetham, of Louisville), have been recorded. In another direction purulent accumulations in the ethmoidal and sphenoidal cells and frontal and maxillary sinuses take place. The ear is frequently affected, chiefly with chronic mucous catarrh and purulent inflammation, the very severe train of symptoms sometimes ensuing upon the latter, not only locally, but generally, as caries and necrosis of the temporal bone, cerebral and cerebellar abscess, sinus phlebitis, and even ulceration of the internal carotid is well known to every surgeon. Alluding to organs more remote, I may instance the case of a boy of twelve years, with healthy parents, who has been under my care, suffering from double hypertrophic rhinitis with complete nasal obstruction. He is very small for his age, sallow, pale, and wizened, backward in his studies, weighs only four and a half stone, face absolutely expressionless. Is it to be wondered that this boy during the past five years has been a martyr to bronchitis, which I hope to cure through his nose? The above symptoms, as well as the flattened and pigeon breast, abdominal respiration, heavy upper lip, and aprosexial expression, are of frequent occurrence in adenoid obstruction. Another and most important way distant organs may be affected is through the inhalation or swallowing of micro-organisms from a purulent discharge from the posterior nares, as occurs in suppuration of the sphenoidal cells, Tornwaldt's disease, and post-nasal cattarrh; besides affections of the lungs, in such cases, we may have a chronic dyspepsia, or diarrhœa, or even in an extreme case, septic intoxication may not be impossible.

In the second place, I propose to bring under your notice the "so-called Reflexes," or rather mechanical obstruction occurring in neurotic individuals. I say, so-called reflexes, because taking the physiology of nasal respiration into account, it is to my mind a question to what extent oral respiration with its attendant evils, plays in such diseases, as laryngismus stridulus, hay fever, and asthma, &c., &c., believing as I do that here the irritation is a direct one on the terminal nerve fibres of the larynx and bronchi, and has no reflex cause whatever; although I am far from drawing any definite conclusion from one or several cases, still I think the following case which has been recently under my care, worthy of record.

Miss E. S., aged 20 years, first consulted me on the 6th April. She was a pale, flabby girl, highly neurotic temperament, of very sedative habits, suffered from hepatic congestion, constipation, and a continuous headache, which nothing would relieve, menses normal as to time, but deficient in quantity, pulse feeble, was perfectly worn out from constant cough and sleeplessness, owing to her asthmatic attacks, being obliged to sit up sometimes in, and sometimes out of bed to get her breath for the last two years. She had but little respite during the daytime from cough and wheezing; had been under medical treatment at various times, and tried change of air, &c., &c., with little or no benefit. She was extremely faint and broke out into a cold perspiration at her first consultation. I had much difficulty, owing to her nervous condition, in making a nasal examination, and when I did so found apparently, at first, nothing to warrant me in giving a positive opinion. The lungs were full of bronchial rales, but there was no emphysema apparent and no cardiac affection. I noticed a slight septal spur on the right side, turbinated bodies normal, but mucous membranes reddened. I prescribed several anti-asthmatic remedies, including inhalations of Nitrite of Amyl and Iodide of Ethyl, besides attending to her general health and hygiene. They had no effect whatever. After a little, I noticed swelling of the right lower turbinated, and next day this engorgement had subsided and attacked the left side. Upon questioning her closely I learned that the nasal obstruction invariably preceded the asthmatic attacks, and upon probing certain parts, violent coughing fits ensued, but no bronchial spasm. These were uninfluenced by the application of a 5 p. c. cocain solution, nor had a 10 p. c. spray any effect in cutting short the asthma. Suffice it to say that, after the application of Chromic Acid, and the cautery several times, the attacks markedly diminished to one every seven or ten days, which I could always predict by a swollen turbinated body on one side or the other. I now noticed the septal spur had so increased in size as to touch the lower turbinated body on the right side. This, with Dr. Knaggs' kind assistance, I removed under chloroform. She has never had an attack since. Is bright, cheerful, and rosy; breathes freely through both nostrils, sleeps well, can walk up or down hill, and has been equally well in rain, fine weather, and westerly winds.

I now, in the third place, come to the consideration of the reflex neuroses proper, in which the element of obstruction may or may not be present. I was frequently impressed, whilst treating this case, with the theory of Weber of Leipsig, that Asthma depended upon a paresis of the blood vessels supplying the bronchial mucous membrane. The result of the case would tend to prove if it were needed the fallacy of the so-called bacterial origin, in Curschmann's spirals which have been proved to be mucin wound into spiral shape in the bronchioles by the laborious in and out breathing. The same applies to Charcot's, or more properly Leyden's octahedral crystals, which are merely disintegrated nuclear bodies. That there are sensitive areas in the nose irritation of which in neurotic individuals produce certain effects, such as cough, sneezing, lacrymation, &c., &c., is a well ascertained fact; and it is a question whether we are (in the present state of our knowledge) able to explain this by any other theory than a reflex one, or in other words can the irritation of the terminal nerve fibres in these sensitive areas, by spur, polypi, &c., &c., alone set up such diseases as nervous cough, salivation, stammering, headache, ciliary neuralgia, facial chorea, blepharospasm, Basedow's disease, and even epilepsy, and yet all these have been reported cured, or considerably relieved by nasal treatment alone.

A few remarks in conclusion upon the abovementioned case. At first sight the apparent absence of nasal symptoms, merely a slight catarrh, the small size of the exostosis barely entering into one's calculations as a causal factor, secondly, the negative effect of cocain which is usually considered an important means of diagnosis, and thirdly, the necessity of perseverance in eradicating step by step every possible cause. The only two symptoms in this case which led me to hope for success were the hyperæmia (alternating) of the turbinated bodies, and the results of probing. Again as to occasional failures in treatment; may they not occur in the first place by insufficient perseverance in the removal of every possible nasal cause seriatim, and in those cases in which the nose has been what the Americans term "cleared out," may not the mistake of removing too much be present, thus depriving the nose of its respiratory functions, the very last thing to be desired. On the other hand let us not fall into the opposite error, as for instance, removing adenoids, when the cause is probably hypertrophic rhinitis. It is thus only by carefully treating each case on its own merits that we can hope to arrive at a successful result, doing neither too little nor too much; and by a careful balance of judgment reach the desired goal, and not bring the all important treatment of nasal disease into disrepute.

On Thyrotomy for Papilloma of the Larynx in Young Children.

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PAPILLOMA of the larynx appears to be a disease of rare occurrence in young children. Recently, at a meeting of the South Australian Branch of the British Medical Association, I reported an instance of it, and there is a case at present in the Adelaide Hospital, under the care of Dr. T. K. Hamilton. A third case was published some years ago by Dr. Clubbe, of Sydney, and Dr. Perks (Medical Superintendent of the Adelaide Hospital) has furnished me with notes of a case which came under his observation at Guy's Hospital. With the exception of these cases, so far as I can ascertain, none have occurred in the experience of my colleagues, nor have any been published in the Australian medical papers. I propose, therefore, to briefly narrate them, and make a few comments upon the operation of thyrotomy, and the indications for employing it.

CASE I. (Dr. Lendon's) *Australasian Medical Gazette*, August, 1892.

J. M., a boy 3 years of age, was admitted into the Adelaide Children's Hospital in 1877, under my care. He had gradually been losing his voice for about a year, and for a month had been subject to paroxysms of dyspnoea at night time. On admission, he was only able to speak in a whisper, but otherwise seemed healthy and happy, and the night after admission, tracheotomy was performed on account of these paroxysms. He was kept under observation for six months, but nothing further developed, and, as he was unable to dispense with the tracheotomy tube, and as, moreover, all attempts to investigate the condition of his larynx with the finger or mirror were futile, feeling almost certain of finding a growth, I performed the operation of thyrotomy in the usual manner and removed numerous warts, with the result that he was soon able to leave the hospital, breathing through the glottis again. He returned, however, after a week or two with a recurrence of the paroxysms of dyspnoea, and tracheotomy was again performed, followed by a second thyrotomy which revealed a perichondrial abscess as the cause of the dyspnoea, but no fresh growths. For two or three months after this he was very ill with broncho-pneumonia, and one day he expectorated pus, whereupon I decided again to explore the interior of the larynx by thyrotomy. The exploration, though negative as far as the discovery of any recurrent growths or any necrosis of cartilage was concerned, was apparently the turning point in the case, as the child began to improve immediately. He left the hospital in January, 1889, wearing his tube still, which he was able to dispense with in the following June, when he could speak in a hoarse whisper. A tracheal sinus persisted, and it was only deemed advisable to close this in January, 1892. His voice now is very good, though rather deep in tone for a child.

CASE II. (Dr. Clubbe's) *Australasian Medical Gazette*, November, 1886.

This was reported in 1886 by Dr. Clubbe, to whom I am indebted, not only for permission to refer to it, but also for the notes as to the sequel to the case.

T. J., a boy *æt.* 4 years, had suffered from dysphonia for about five months, and dyspnœa for five weeks before admission into the Sydney Sick Children's Hospital.

Tracheotomy was performed on the day after admission, and a few days later warts beneath the vocal cords were seen with the laryngoscope. Repeated attempts were made to remove them by the endo-laryngeal method before thyrotomy was resorted to, and the operation was repeated twice before Dr. Clubbe published the case. Since then, he writes to me (May 1st, 1892), that he had to perform "the operation over and over again, at least a dozen times, at all events every three months for some years, as the warts kept growing." He further curetted the mucous membrane and used various caustic, and other applications after the operation until, at last, in 1889, the warts ceased to grow. In a later communication (August 12th, 1892), Dr. Clubbe informs me that thyrotomy was performed seventeen times, the last occasion being July 25th, 1889. As a result of these repeated operations, a stricture of the larynx ensued, which he has, as yet, failed to cure; so that the child now breathes through a tracheal sinus, no tube being necessary as the skin is adherent to the edge of the trachea. He can breathe comfortably through the glottis by day with the tracheal sinus covered with a pad, but dyspnœa occurs at night time unless it be uncovered.

Dr. Clubbe does not propose to do anything further until the patient has reached the age of puberty, as he can speak fairly now.

CASE III. (Dr. T. K. Hamilton's.)

E. A., a girl, *æt.* 17 months, was admitted into the Beatrice Ward of the Adelaide Hospital, under the care of Dr. Hayward on August 19th, 1891, and transferred to Dr. T. K. Hamilton, Physician to the Department for Diseases of the Throat, by whose kind permission I am allowed to report the case. No history of the case is obtainable, but on admission the child had inspiratory dyspnœa and a short eroupy cough. A small wart was noticed on the upper lip, another on the tip of the tongue, and two more in the right armpit. On August 26th, tracheotomy was performed by the House Surgeon in an emergency, and two days later Dr. Hamilton explored the larynx by division of the thyroid cartilage, when he found a large papilloma, springing apparently from both sides of the anterior commissure. He removed it with the forceps, and touched the site from which it sprang with solid silver nitrate, and united the thyroid cartilage with one silver wire suture, and the skin with two silk sutures. The same afternoon the child coughed up fragments of papilloma through the tracheotomy tube. There was the same trouble when the tube was removed for cleaning, as in Case I (*Australasian Medical Gazette*, August, 1892), the larynx having to be kept open with forceps, and, on one occasion, artificial respiration was required, as the tube had slipped out or been coughed out. On January 6th, 1892, and August 3rd, the operation was repeated, and growths were removed on each occasion with forceps and eurette. The child is now thriving well and learning to speak. Her articulation is clear, but, as yet, she only speaks in a loud whisper. She is not able to dispense with the tube, May, 1893.

CASE IV. (Dr. Porks.)

E. M., a girl, two years old, was admitted into Guy's Hospital on January 15th, 1893, with a history of dyspnœa and noisy respiration which had existed for about a twelvemonth, the dyspnœa being paroxysmal and nocturnal. She was plump and healthy, not cyanosed, but still breathing in a laboured manner, with sinking in of the epigastrium. Nothing is mentioned about the voice being altered. On the following day a sudden paroxysm of dyspnœa necessitated tracheotomy without an anæsthetic. Suffocative attacks were very frequent afterwards, and the child could not breathe comfortably without her tube for more than a few minutes. Attempts to accustom her to do without it failed until February 6th, when it was left out till February 12th, and the wound became almost closed. On the last mentioned date it had to be reopened. Attempts to use the laryngoscope failed, then the tube was left out by day and replaced by night until, on March 26th, it was disused, and the wound again allowed to heal. On April 8th, dyspnœa recurred, and tracheotomy was performed again. Subsequently the child contracted diphtheria, and died on April 23rd.

At the autopsy extensive diphtheria was found and two papillomata, one on the left cord, $\frac{1}{4}$ inch in diameter, like a flat plaque, and another of the same size, lower down on the same side, opposite the cricoid cartilage.

REMARKS.

As the symptoms caused by the presence of papilloma in the larynx are so gradual and insidious in their onset, and as they bear a close resemblance to those of other laryngeal affections common in childhood, it is probable that all cases occurring in young children would first come under the care of a general practitioner, rather than that of a laryngologist. It therefore behoves us to be familiar with these symptoms, which are in no way special, but are merely those common to any benign growth of the larynx, and it is remarkable how very closely the history of one case resembles another. As a rule, for a long time, usually several months, the only symptom that attracts attention is a gradual alteration or weakening of the voice (dysphonia) leading ultimately to complete loss of it (aphonia), so that the child can only speak in a whisper, and makes no sound when crying; cough is a very rare symptom, pain is almost unknown, there is no difficulty in swallowing solids, and, indeed, the act of drinking seems to relieve the paroxysms of dyspnœa, which, after a time, commence principally at night, and which lead the parents to seek advice. These paroxysms are easily induced by emotion, and, as a rule, are distinctly inspiratory in character, as one would expect since the growths are usually situated above the glottis. It must not be thought, however, that the diagnosis of such growths is always easy. In my own case, I felt confident after a time that there was such a growth present, for the long persisting dysphonia, unaccompanied by a croupy cough, negatived the idea that it was merely an inflammatory or nervous affection. Now it so happened, that some few years ago, I had under my care a case of laryngeal obstruction in a little girl, upon whom I performed tracheotomy. The cause of her dysphonia and dyspnœa remained obscure for about three months, when at length a dulness was detected to the right of the sternum and afterwards in the right interseapular region: four months later still she succumbed to a mediastinal tumour, possibly adenosarcomatous. Bearing this case in mind I allowed six months to intervene between the operations of tracheotomy and thyrotomy. Of course, the diagnosis is easy where one is fortunate enough to be able to see the growths

with the laryngoscope, as in Dr. Clubbe's patient, but this can be seldom done in young children. In Dr. T. K. Hamilton's case, I believe Dr. Hayward, who was familiar with my case, entertained a strong suspicion of papilloma, because warts were visible on the lips, tongue, and skin. In the same way I have noticed the association of papilloma of the bladder and of a wart on the scalp. Digital examination, however, does not appear to be of much use, nor can reliable information be gained by passing a probe, as the warty growth offers no resistance to it.

The prognosis would be very grave if the growth were left alone. Tracheotomy is, however, nearly always required in young children before the true nature of the case is made out, and it is of great advantage in the subsequent treatment of the case, for it renders any operation, whether endo-laryngeal or otherwise, easier to perform and lessens the after risk of œdema of the glottis. It is palliative as regards life, averting the danger of suffocation during a paroxysm, although it must be remembered that tracheotomy has dangers of its own. In my case, on two occasions at least, the house surgeon had to be hastily summoned to the child when suffocation was impending from the accidental slipping out of the tube, and in Dr. Hamilton's case the same trouble was reported. In the cases reported by Dr. Perks, diphtheria was evidently contracted through the tracheal opening. However, besides allowing us to gain time and await developments in a case where the diagnosis is doubtful, and perhaps enabling us after a time to inspect the glottis and establish a diagnosis, and possibly admitting ultimately the removal of the growths per vias naturales, tracheotomy may also possibly be curative; at all events it has been alleged that such growths may disappear with the functional rest which the tracheotomy tube affords the larynx. The only positive evidence I can find in favour of the 'spontaneous disappearance of laryngeal papilloma is, to my mind, not quite convincing, for the writer (Dr. Hunter Mackenzie, *Edinburgh Medical Journal*, 1883 and 1884) speaks of a thickened warty condition of the glottis boundaries, which resulted from the chronic inflammation; but in his original communications he did not diagnose warty growths. Still there is some evidence to support this idea of the spontaneous cure of papillomata, for it has long been an accepted belief that old women could charm away warts on the hands, and I have always been taught that the so-called venereal warts will also disappear, if only they be kept perfectly dry with lint. If, however, laryngeal warts may occasionally disappear as alleged, it is singular that no instance is recorded of such spontaneous disappearance in an adult, seeing how much more frequently they occur in adults than in children. Of the 100 cases which formed the basis of Morell Mackenzie's original essay on benign growths in the larynx, no less than sixty-seven were instances of papillomata, and of the 100 cases only six were under the age of 10 years. The opportunities for observing any such retrograde change would, therefore, be infinitely greater in adults. Whether a preliminary tracheotomy has or has not been performed, whenever in a young child either growths have been detected, or there is a reasonable suspicion that they exist, the question will arise as to whether they should be removed by thyrotomy or by an endo-laryngeal operation. Now, some twenty years ago there was waging a bitter wordy war, in which Dr. Morell Mackenzie and Mr. A. E. Durham were the principal antagonists. Their arguments, however, still seem to me to hold good, for their differences of opinion were not in reality very serious. Mackenzie enunciated his off-quoted dogma that thyrotomy was only justifiable when there was danger to life from suffocation or dysphagia, and then only provided that an experienced laryngologist had pronounced it impossible to remove the growth per vias

naturales, to which some one has added, and then only provided that an experienced laryngologist has attempted to remove it. There can be no doubt that endo-laryngeal operations may be successfully performed upon young children by men possessing the marvellous manipulative skill of a Morrell Mackenzie. Indeed, long before the days of cocaine, he removed growths from children aged 6, 5, and 4 years respectively, and Prof. Paul Bruns states in his work that several instances are on record in which the endo-laryngeal operation has been successfully performed in children 6 months old; but until the general practitioner attains to this degree of skill, and whilst cases occur in places in which patients cannot avail themselves of the services of such skilled laryngologists there will still be occasional instances in which it will be necessary to divide the cartilages.

Thyrotomy does not seem to be very dangerous to life nor difficult of performance as a rule, though both danger and difficulties may be met with. The chief dangers are avoided by a preliminary tracheotomy, and by operating with the head in a dependent position; but as regards the voice there is very great danger, as statistics show that its recovery is the exception rather than the rule. Recurrence is very frequent after thyrotomy, in 35 per cent. of cases either it is impossible to remove or destroy all the papillomata, or else the growths do actually recur: my own impression is that they are not destroyed, and that young budding growths escape and continue to grow. The operation may, however, be indefinitely repeated, and a good result finally obtained. Recurrences are stated not to be so frequent after the intralaryngeal operation, but these are performed at numerous sittings.

As regards the technique of the operation in a future case, I should be inclined not to wire the cartilage together as Mackenzie did, or sew it with silk as I did myself, but to trust to the alæ falling naturally into correct apposition.

Lastly as regards the causation of laryngeal papilloma, I am inclined to think that chronic hyperæmia and chronic catarrh of the mucous membrane are scarcely satisfactorily established as predisposing causes, seeing that there is proof that such growths are occasionally congenital, just as we know them to be in other situations, and if croup and pertussis, as is alleged, also predispose, how is it they are not much more frequently met with? It is more probably to my mind that the growths may give rise to a pseudo-croup before they are large enough to cause aphonia or dyspnoea, and that the effect is mistaken for the cause of the growths. Pathologically papilloma is considered by Virchow to be a species of fibroma, and he denies the existence of any special fibromatous dyscrasia, but when we meet with cases in which warts on the skin are associated with papillomata of the larynx, of the tongue, lip, and bladder, one feels that there is something more than mere coincidence in the association. I was at a loss to understand how papillomata should arise from the mucous membrane of the larynx, until I found that the explanation had been given by Fauvel (*Brit. Med. Journal*, January 20th, 1877, p. 73), who quotes a discovery by Coyne, that papillæ exist "in the free borders of the vocal cords, especially in the anterior half of the larynx."

The manner in which the growths are seen to be confined to the neighbourhood of the cords, and the appearances depicted in some fatal cases, suggest that from an original papilloma, others may arise by infection. Not only is this consistent with the belief in the contagiousness of warts on the skin, and the well-known fact of the infection of the peritoneum with papillomata, after the rupture of a papillomatous cyst of the ovary, but it is

also possibly an explanation of the frequent recurrence of laryngeal papilloma if we suppose the parent growth to have been removed, and the secondary growths to have escaped notice at the time of the operation.

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The bearing of Certain Conditions existing in the Nasopharynx, upon Tympanic Disorders, and other derangements of neighbouring membranes.

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CATARRH of the mucous membranes is defined by Jonathan Hutchinson, in these words:—"A brief nervous fever preceded by a rigor, and attended by increase of temperatures, great sense of chilliness, and much general discomfort. It is always symmetrical; always due to reflex disturbance, never to local irritation. The products of catarrh are infectious, catarrhs, being neurotic, observe stages, and show a tendency to subside spontaneously." From the above remarkable words it is very clear that this authority makes a sharp distinction between catarrh and inflammation, a distinction not equally heeded by some other writers. M'Donald, for example, seems to confuse these two conditions ætiologically. The truth appears to be that inflammation, not catarrh, is produced by local irritants; catarrh, not inflammation, is produced by moist atmosphere, and sudden changes of temperature acting upon nerve ganglia, in some way susceptible to their influence. Whatever fine distinctions may be based upon the etymology of the word *catarrh*, the soundness at bottom of Hutchinson's definition cannot be doubted. In the beginning of an attack of this nature, there is certainly no inflammation of the parts. The local circumstances attending inflammation are substantial changes in the walls of the blood-vessels, and the tissues outside of these. In a catarrh, on the other hand, there is at first only a change in the calibre of the vessels. To begin with, a contraction, which is followed by a dilatation with increased flow of blood to the parts. It is only when a condition of stasis has been induced that a venous hyperæmia sets in. The cell elements within the connective tissue are stimulated to abnormal activity in which new cells are generated; there is excessive secretion of glands, and abundant transudation of the liquor sanguinis. Hence, we may set it down that the more extreme the action of the vasomotor nerves the greater the cell-generation, and the less mature the cells with which the surrounding tissues become packed. The actual irritation which causes this packing of the tissues with leucocytes appears to be the venous hyperæmia which exists in the part, setting up, as it does, a stasis in the lymphatic spaces of fluids overladen with crude and poisonous products, such, for example, as uric, lactic, butyric, and in some cases acetic and oxalic acids. The cells once laid down in the tissues of a part where the lymphatic circulation is not easily re-established commence in a very short time to undergo those metamorphoses which are characteristic of what is, I think, not very properly called "chronic catarrh." And the actual varieties of this chronic inflammation in different parts of the respiratory passages, whether there shall be hypertrophy, atrophy, or ulceration, or the formation of neoplasms—depend almost entirely upon the *occasio loci*. The peculiar features indicating syphilis, diphtheria, tubercle, appear to me to be superadded, as it were, to the essential phenomena of inflammation, rather than to present an essential distinction from them.

But I must apologise for spending so many words in bringing before you questions I think now fairly well removed from the kingdom of theory into the demesne of fact, and as such well known to every one of us. In doing so, I merely was desirous of showing that exactly similar changes go on in special structures of mucous membrane, named closed follicles or tonsils, according to their situation in the tract. As you are very well aware, there is no essential histological distinction between the solitary follicles, and Peyer's patches of the intestine, and the tonsillar structures of the base of tongue, fauces, and nasopharynx. These are all structurally lymphatic glands, being composed in substance of two or three kinds of round cells, enclosed in fine meshes of connective tissue and with certain lymphatic channels running through them in specified directions. The faucial tonsils, and the follicles of intestine are more specially enclosed in fibrous-tissue capsules, on which many of the symptoms of their inflammation depend. So far as we can gather from observations, the tonsil has in health, at any rate after birth, no function whatever to fulfil. It certainly is not secretive, and Hodenpyl, an American observer, has not been able to discover that it is absorptive, excepting where the epithelium covering it has become rarefied; under these circumstances—it is interesting to add—he thinks the diphtheritic poison may be absorbed, but he has never seen any proof of the absorption of the tubercular virus. There is, however, every probability that being of the same structure, for example, as the glands of the axilla, it has a like function, the absorption of lymphatic fluids—in this instance from the neighbouring mucous membranes. And we know that the solitary follicles of intestine do swell up in diseased conditions of that membrane. We can, therefore, only believe that inflammations of the tonsil are in the first instance a consequence of inflammation of pharynx, nasopharynx, and parts adjoining.

The question as to the simple hypertrophy of the tonsil being possible without previous inflammation, may, I think, be very shortly answered in the negative. No satisfactory or plausible proof of it has ever been adduced; and what Morell Mackenzie means when he speaks of "congenital causes" is by no means clear. It is very unlikely that an inflammatory hypertrophy of the tonsil is ever primary. It appears to be secondary in its nature, and the primary inflammation is no doubt overlooked because from one cause or another its symptoms are either trifling or disregarded.

There are many examples known to the pathologist of passive hyperæmia causing hypertrophy. It is sufficient to mention the three great organs of the body, the heart, liver, and kidneys, for instances; and it is specially marked in many of its forms in subjects suffering from the syphilitic and strumous dyscrasiæ.

But now, allowing that an inflammation of the tonsil is secondary to that of the surrounding membrane, how does it come about that the tonsil hypertrophies, and not usually to any extent, the membrane? In the *first* place, the tissue is more spongy and therefore more exposed to the lymphatic stasis, *secondly* the tissue liable to proliferate is much more copious in the gland than in mucous membrane, and in the *third* place, the situation of the part allows it to expand mechanically with great ease in the direction of least pressure, which as it happens is towards its fellow. Finally, one cannot omit to mention that curious and in many cases very latent and inexplicable tendency which exists in many young subjects towards a special proliferation of lymphatic cells. This at least, so far as I have yet learnt, is unexplained, being associated somehow with the deeper mysteries of bioplasm and heredity.

And now with respect to the tonsil of Luschka, we may promise that it, situated as it is in the nasopharynx on its posterior wall, has exactly the same histological structure as the faucial tonsil, but differs therefrom after some fashion as a fish's gill differs from an amphibian's lung, being pedunculated and free in an air cavity, while the other is incarcerated deeply on most sides in a strong fibrous capsule. Unfortunately for the analogy, there is no likeness of function, for under no ordinary circumstances is there any absorption of fluid. On the other hand I believe the tonsillar function to be exactly the same in the two instances. Luschka's tonsil expands under like conditions of passive hyperemia, and its tissues proliferate into the large open cavity that communicates with nose, ear, and throat. It has often been remarked how pronounced it is in many cases of cleft palate. The reason appears to be connected partly with the increased size of the cavity, partly with the direct suction of the tongue upon the nasopharynx, and partly perhaps the irritant action of the food coming in contact with it.

But the symptoms of tonsillitis are often very severe and even urgent: how does it happen that an inflammation of Luschka's tonsil is never so acute? In answer to this, it is certain that in many cases the actual inflammation is just as severe. If the symptoms are not so pressing, that is due to the anatomical arrangement of the structures. The pain in an ordinary quinsy appears not to be intrinsic but due to tension of the surrounding sheath; otherwise it is more truly a sense of discomfort in swallowing, breathing, and speaking—certainly at times very severe—and a general malaise. The proliferated masses of Luschka's tonsil differ from those of the faucial tonsil, in being arranged more or less on pedicles, and in projecting almost wholly free into the cavity; and thus the tension expends itself entirely in expanding the nerveless and insensitive body of the vegetation into that cavity. And as nearly the whole discomfort of the inflammation of such tissues arises from an external resistance to the tumefaction it will at once be seen why the adenoid growths, as they are called, are so free from symptoms. But on the other hand they are not free from symptoms; they have a very distinct group of their own. It is comparatively seldom, excepting in the specific fevers, such as diphtheria and scarlatina, that we recognise their enlargement accompanied with malaise and pyrexia; and yet this may be sufficiently accounted for by the statement that an ordinary severe feverish cold seldom can cause enlargement enough to set up the symptoms indicative of their presence. We are not aware of their existence except when they become large enough to cause obstruction mechanically. And if the parts could be readily laid bare to the light of day, we should, much oftener than at present, be aware of an enlarged tonsil of Luschka, when we supposed ourselves to be suffering merely from an ordinary bad feverish cold. It is only because of the difficulty which is supposed to be connected with the use of the rhinoscopic mirror that hypertrophies and enlargements of this gland are so little recognised. And yet, in my own practice, it is but a very small percentage that I have failed to examine in this way, while of the remainder quite half have had an appreciable swelling of the structure in question. Furthermore, I believe it to be the case that precisely those throats which from their configuration are most easily inspected, are most liable from one cause or another to suffer in this way. It appears to be more the rule than the exception to find some degree of disorder of this gland; for its recognition at all as a source of trouble, we have to thank the rhinoscopic mirror. I have often seen the gland more than half filling up the nasopharynx, acutely congested, and bathed in discharge, and with white masses of denser secretion oozing out from between its

bosses, just as they do from a faucial tonsil. I have in fact seen nearly all the visible features of a quinsy repeated upon this more occult gland. The exception is abscess; in the true sense of the word, this appears very seldom to form in nasopharynx. Bosworth has well remarked that a mucous sac continues to secrete mucus so long as the exit is free, but that when its mouth becomes closed the secretion being under tension gradually takes on a more and more purulent character. This is probably the rationale of some cases of tonsillar abscess; and if it be so the absence of crypts in the tonsil of Luschka explains why abscess is there so uncommon. I have certainly opened in operating what seemed to be a small collection of pus; but as there was evidently no particular tension of the part, it was probably a product of degeneration going on within one of the pedicles. Unfortunately no microscope was at hand to settle the point.

Clinically, then, the chief indication of these adenoid vegetations is the obstruction which they cause to proper ventilation of the passages, and the congestion of the veins and lymphatics leading from surrounding parts. Even when fairly small they thus encourage mucous discharges from the membranes of nasopharynx, nose and tympana. And the tympanic cavities in particular, being so nearly closed, are readily deprived altogether of their ventilation; the air within them becomes rarefied, the membranes are indrawn, the ossicles fixed, and other secondary inflammatory changes follow in both middle and inner ear, which there is no need to dilate upon in this place. Many of these changes may follow, as Bosworth has shown, without complete closure of the Eustachian tubes. In the severer degrees of adenoid enlargement, these aural changes are much intensified, and others begin to exhibit themselves in parts of the nose nearer the free air. The mucous membranes covering turbinals, septum, and floor of nares swell up in the most remarkable way, still, however, remaining very often quite pale, and apparently not hyperæmic, and they become bathed in their mucus. And externally the nose as a feature of the face appears to contract bodily, the alæ and bridge seeming to close in upon one another, and very often no current of air passes through the nose at all. In connection with this nasal obstruction we find very often, as might be expected, lachrymation and tenderness of the eyes. So far as I have seen it is only in the very worst cases that the peculiar mental condition, aprosexia, is developed. It is pretty certain that this is an actual condition, and not an apparent one due only to deafness or childish inattention. In one of my cases, a bad one, it was excessively marked; so that the boy—unlike the rest of his family in this matter—had apparently no natural bent towards any intellectual or physical excellence, except in the bull-headed pastime of football. After the removal of the vegetations his teachers began soon to detect a change, and he was set to learn Euclid. The cause of the want of mental grip to which this imposing name has been given, is ascribed to a state of lymphatic stasis at the base of the brain. I suppose some such explanation would receive the approval of Dr. Batty Tuke and others, of the material school of insanity. It is certainly hard to conceive any other, when we recall to our mind the many minute foramina communicating between the cranial cavity and the nasal passages, and the fact that this mental condition is common in bad cases of nasal polypus.

A necessary consequence, of course, of obstruction of the nose and post-nasal passages is that the patient must breathe through the mouth; and the snoring so much complained of at night, is merely the vibration in the passing current of air of a relaxed and paralysed soft palate. In a young child suffering from this trouble, especially if the faucial tonsils be at the

same time enlarged, it will often be found that the chest-walls cannot expand properly, and that the sternum therefore is bulged forwards. Many of these cases are, whether as a cause or a consequence, anæmic.

We have thus in a bad case a very distinct and unmistakable picture—the very features and speech will tell the tale; the deafness, and powerlessness of concentrating the attention upon any pursuit, and the nasal obstruction will sufficiently confirm it. The hypertrophy of the turbinals, and the polypoid neoplasms which might trouble the diagnosis, are so much less frequent in children than in adults as here to cause no practical doubt. And then a thorough examination of the nasal passages, anteriorly with a speculum and probe, posteriorly with a rhinoscopic mirror, will always decide the matter.

In very young children, however, extraneous circumstances usually prevent anything more than a passing glimpse with the mirror; if this be insufficient to give even a shrewd guess at the state of the part, we may find on inspection of the pharynx with the bright light that the soft palate is more or less convex, and bulged downwards by a body behind it. It may be felt by the finger to be so. Often some diminutive portion of the vegetations takes origin in the pharynx; but, on the other hand, the lower margin of the seat of growth is often very sharply defined as it were, by the pressure of the edge of soft palate against the posterior wall of pharynx. It thus becomes necessary to clinch the diagnosis by inserting the upturned forefinger of one hand quickly and steadily behind the soft palate, the child's head and limbs being firmly held the while, and the examiner's hand, if he be timid, protected by a bit of glove against the sharpness of the child's tooth. By passing the finger straight in over the tongue, the edge of the soft palate with the uvula is felt; and a somewhat slim finger-tip will easily turn the edge of this, if it keeps the nail well against the back wall of the pharynx. The tip of the finger in the cavity is under the disadvantage of having its nail against the growth, and can therefore only roughly feel how long the pedicles are, and how far the choanæ of the nose and the Eustachian tubes are covered; and if the manipulation has been at all rough there will be a little blood staining the nail. Even with the finger-nail the peculiar bossy-cushioned sensation of the growths projecting before the vomer will be quite easily distinguished from the clear hard vaulted space of the healthy cavity.

In such a case as I have just described operation is always somewhat urgent, and its neglect will cause serious injury of the tympanic mucous membrane. Young children should always take an anæsthetic, chloroform given with a Junker's improved inhaler being preferred; older patients may be operated upon without. In the former case, of course, the instrument is inserted into the nasopharynx in the dark, and the operator is guided partly by the tactile sense conveyed through the instrument, and partly by occasional use of the forefinger. This method of operating is certainly rapid, the whole of the cavity being often cleared in a quarter of an hour; but I am quite certain it is not without care very thorough; for I have occasionally found that small tags which were quite impalpable to the finger at the time of operation have afterwards blossomed into vegetations fullgrown, though certainly not very extensive. The anæsthetic, moreover, is objectionable, being a source of risk and inconvenience. It is much better, if possible, to operate under guidance of the rhinoscopic mirror; it usually takes several sittings, but one can have visual assurance that everything is gone. Pain and reflex movements can be pretty well annulled by the use of "milky cocaine." The only satisfactory way of getting room in the throat is to tie the soft palate forwards by means of a small tape passed through the nose; even this is not invariably required. As for instruments, there

seems no question that Löwenberg's lateral, and Mackenzie's antero-posterior cutting forceps are the best; I also use a curette in young children for scraping off the remnants. The galvano-cautery is not practical in these cases; the wire slips off the growths very easily, and fails to catch them; and the scar which is left by burning the roots of the growths is so extensive if the cauterisation be thoroughly carried out as to endanger subsequent dryness of the parts from destruction of the mucous and racemose glands. And the destruction of mucous membrane does not need to be so widespread. As for Meyer's ring-knife and other instruments which have to be passed through the nose, their applicability is necessarily limited, firstly by the very much contracted and sometimes almost obliterated passage through which they have to be directed, and secondly by the small area which they cover in the nasopharynx. In operating under chloroform or in a very small child, a Ferguson's gag would receive the preference; but gags are very much in the way where the subject will open his mouth voluntarily. As for those cylindrical mouth specula which are supplied in nests, they are useless, and even dangerous.

The result of the removal of the vegetations is the relief of all the symptoms in a few days. The passages of the nose open rapidly, the snoring stops and sleep is quiet, and where the aural disorder is not profound it is possible for the hearing-distance to restore itself spontaneously. Even where the physical features of the drumheads are organically and seriously altered, it is almost without exception that some increase in the hearing and relief of tinnitus takes place after suitable treatment, but without much alteration in the local appearances. This arises from the fact that the aural disorder is generally in these cases fairly acute, and has never gone on to the formation of fibrous adhesions, and to atrophic conditions of the mucous membrane. I have, however, lately had one case in which there was no advancement made in the hearing. This was a child of 18 months, weakly and strumous, in which there was at the beginning no perception even of the loudest and most explosive sounds, the drum-heads being deeply sunken and leaden coloured in a way which, though no syphilitic history could be got, was very suggestive of it. The probability was that serious infiltration of the labyrinth had here already taken place, and the child was operated on as much to improve its health as its hearing.

As for the after treatment of these operative cases, there is usually more or less fever at first, which may or may not require attention. All discharges should be removed by means of an atomiser with some alkaline antiseptic fluid passed through the nares. The child is usually about on the third day. The ears require attention as soon as the sores have sufficiently healed up to admit of the passage of a catheter, and the tympana should then be inflated with suitable vapours to meet each case. In some of these cases the final result is complete restoration of hearing.

I have here been describing what should be done in a severe case of adenoids. There are other cases varying in severity from the least to the greatest; it remains to say a word upon the treatment of the lesser forms. We enter here upon a matter involving some consideration and judgment. As elsewhere the touch-stone of treatment is the necessity of intervention; and so long as no danger to important organs and functions is threatening the vegetations may be allowed to remain. But on the other hand it is a very remarkable thing how often in nearly all forms of ear-disease, the congestive more especially, we find the nasopharynx, and other parts of the respiratory organs suffering in common, usually with a like congestion; and if the arguments I have just been upholding have any soundness in

them, it stands to reason that treatment of enlarged and eongested nasopharyngeal tonsils will bear good fruit in the improvement of the tympanic membrano. But, it will be said, this good effect is due to a change in the state of the nasopharyngeal mucous membrane, and not of the gland. Now it appears to be seldom that an alteration in one mucous membrane of the body occurs in consequence of a derivative action upon another. To take a familiar example, the tannic acid in that well-known pigment the glycerole is known by pharmacologists to have a dilating action upon arterioles. The result is naturally an increase in the venous stasis, and in many throats more turgescence and irritability than there was before; and it would appear that any benefit which may from time to time arise from its use is due not to its derivative action on the mucous membranes, but to its contractile and alterative action upon the newly-deposited round cells of which the tonsil contains so comparatively large a proportion. Similarly with that much more useful pigment, silver nitrate. So then in such derangements of the tympanic and nasopharyngeal mucous membranes, as we are discussing, it would seem judicious where the pharyngeal tonsil is enlarged, but not so much as to prompt removal, to apply the more sedative and less irritating pigments and insufflations. A few strokes with a galvano-eaustic point will often do wonders in absorbing the hypertrophied tissue. Iodine in its various forms, is most useful, either painted on the part in the form of the tincture, or applied as iodoform or iodol. The camphors and stearoptenes are most excellent in their place. Tannic acid must be applied to the nasopharynx with considerable caution, because of the irritability it often exites. Of course, in many cases, before these substances can be applied to the parts, it is necessary to remove a more or less glairy or incrustated layer of mucus. A solvent alkaline spray is then useful to begin with, to which may be added camphor, menthol, salicylic acid, thymol, terebene, or other substances as the individual case may suggest. But in all cases it is most important to secure that this mucous layer be removed; otherwise the local pigments and insufflations will do more harm than good. Under such treatment as this it is quite usual for the smaller hypertrophies to subside so much as to give no practical trouble, and for the nasal, post-nasal, and aural symptoms to improve accordingly.

I may wind up these few remarks with the statement that as time goes on I am increasingly satisfied how important it is in ear affections to pay particular attention to the state of the nasopharynx; and I am sure that the judicious treatment of this part is often the keystone of success in cases which otherwise would often be dismal failures. If the ear is an inaccessible organ because of the bony protecting walls which gird it around, we have yet to bear in mind that this very property is a safeguard against disease; and that the gates of weakness and of succour are the same—the Eustachian tube. If we could prevent trouble from passing through this channel into the ear, we should without doubt do away with nearly three-quarters of the ear trouble that exists; and, as time goes on, I am more firmly convinced how important it is in all ear cases without exception to pay special attention to the contents of the nasopharynx.

Notes on a Form of Senile Otasthenia.

W. F. QUARF, M.B., C.M., Glas.

IN his paper the author contrasts cases of impediment of hearing occurring usually in somewhat advanced life, and characterised by the fact that difficulty of hearing is increased by noisy surroundings, with cases of paracusis Willisiana. He describes a method of testing hearing-distance by means of the telephone, and remarks that he found in the class of cases first alluded to "the hearing of simple sounds in the telephone-receiver was much better than the hearing of a watch sound, while in ordinary cases of catarrh, for example, in young persons the two tests would fairly tally," and discusses the reasons for this difference.

Notes on Adenoid Vegetations in the Nasopharynx; with special reference to the forms of deafness connected with their presence.

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ADENOID vegetations are somewhat common in Queensland, and as advantage has been taken of my opportunities of studying a considerable number of cases, I have thought that good and knowledge may be gained by introducing them as a subject for discussion here. There appears to me to exist some undecidedness regarding the manner in which these growths produce ear symptoms, and upon this point I shall try to throw some light. They have been thought to be on the increase, partly because comparatively few of the cases of deafness met with in persons of adult or still more of middle age, are ascribed to them or to their previous existence. And partly also, no doubt, because their frequency and importance has not been fully grasped until of late years, and is perhaps barely so now. That comparatively few of the cases of deafness in after life have been ascribed to these growths seems to me to depend upon an at least possible fallacy. Many of the cases of chronic middle ear catarrh met with in adults may have had their origin from them; and, indeed, deafness in adults as the result of former attacks of acute middle ear catarrh may have had the same primary cause. The fact that adenoid vegetations in a certain proportion of cases shrink and even disappear with adult life, lends support to this. Deafness, often very intractable, may be the legacy they leave; and the cases of deafness in adults where signs of sclerotic changes in the internal ear are present could depend indirectly upon the same cause. All of us, who have paid special attention to diseases of the ear, must frequently see cases in whom the changes are so marked in the middle ear as to leave no doubt that the

affection commenced there, while, from further examination just as little doubt remains that the internal ear has become affected, and probably by continuity. In this connection it may be interesting to record a fact noted over and over again by myself, viz., that when consulted for naso-pharyngeal and pharyngeal trouble by adults, I have frequently observed traces of adenoid vegetations on the naso-pharyngeal roof, and upon examining the ears in all such cases even where no deafness has been complained of, distinct alterations have been observed in the drum membrane while hearing has been found to be below normal.

THE EFFECT OF THESE GROWTHS.

It will be unnecessary to dwell upon the characteristic appearance, peculiar breathing, and tendency to "colds" to which they give rise; these are pretty well recognised. I should like, did the limits of this paper permit me, to say more regarding their influence upon the general health, and the remarkably beneficial effect upon this of their removal, in almost every case. So convinced have I become of their injurious effect upon the health of a child, and that at an age when all obstacles to healthy development and growth should be removed, that I always when possible examine for them in the cases of children who are chronically pale and sallow, badly nourished, and deficiently developed, or narrow-chested. And if a child from being plump and rosy during the first few years of life, begins to fall off in general health and appearance without any perceptible cause, and sometimes even without sufficiently heavy breathing to attract its parents' attention, adenoid vegetations should be suspected. I shall never forget the pleasant impression left upon me by a lad of 17, from whose naso-pharynx I had removed numerous vegetations more than three years previously. They had then caused extreme deafness, which was in part, at least, recovered from after operation. At 14 he was an unhealthy looking stunted boy, in addition to being stupid from his deafness, and gave no indication of future growth. When he called to see me at the age of 17 I had a difficulty in believing him to be the same. He had developed into a strong, broad-shouldered, and fairly tall young man. He consulted me again on account of a recurrence of his deafness, due, I found, to a partial return of the adenoids. This I ascribed to imperfect removal, for, at the time, although I used my present nail for operating, I had not adopted the position of hanging head, and therefore did not give chloroform on account of danger from bleeding. The operation was therefore too painful in spite of cocaine to be very thorough. Complete removal at the age of 17, and a few weeks subsequent treatment, restored his hearing to natural, and he now exists as a young man of 19 years, not only with perfect hearing, but with health and physique which would, I believe, never have been his had the vegetations been in the first instance left.

Since adopting the position of hanging head for removal of adenoid vegetations under chloroform, I have been able to operate upon them with such little feeling of anxiety, and with the nail I used so thoroughly, that I have practised it very frequently and paid special attention to my cases before and after operation.* During the last two years, I have operated upon some sixty cases of all ages from 7 months up to 20 years. I have learnt also from cases who refused operation, and also from some adults in whom the vegetations were not too numerous to admit of their being removed under cocaine, with the aid of the rhinoscopic mirror and by Löwenberg's forceps; and I have

* This operation was described by me in the *A. M. Gazette*, 1890.

come to recognise, at least, four methods by which they produce deafness, viz.—1st, by Eustachian blocking, either indirect or direct; 2nd, by recurrent acute perforating middle ear catarrh; 3rd, by recurrent sub-acute middle ear catarrh; 4th, by chronic middle ear catarrh.

1. *Eustachian blocking*.—They cause this most frequently indirectly by causing swelling of the lining of the Eustachian tubes and orifices. This swelling is probably due to venous obstruction, and is usually of a passive nature, as it can be overcome by Politzerisation or catheterisation with temporary alteration of the position of the membrana tympani and equally temporary improvement in hearing. They occasionally block the orifices directly; more frequently they entirely prevent ordinary nasal breathing, and so prevent the in-going and out-going current of air past the orifices, which has almost the same effect as blocking them. I would draw special attention to their indirect effect in causing swelling of the lining of the tubes, as this cause of deafness, by them, is not sufficient appreciated. It may be caused by comparatively few vegetations, and by them without any evident sign of nasal obstruction. It seems fair to ascribe their action to venous obstruction rather than to active hyperæmia, though no doubt this may be and is also a cause. It will be readily granted that very slight swelling of the lining of a tube of such calibre is sufficiently to interfere with its patency. The method by which they cause Eustachian blocking can I think be explained, as I shall endeavour to do further on in this paper. The appearance of the membrana tympani is so typical in these cases that I occasionally make use of it as a diagnostic sign in children who are brought to me suffering from the throat or nose, and in whom deafness may not have been noticed by their parents. Children indeed may possess to tests only half or even a quarter of natural hearing without their parents recognising or even admitting them to be dull of hearing. Many children allow a post rhinoscopic examination very well, but in those who will not allow a thorough one, I have diagnosed vegetations as a result of an imperfect examination together with this appearance of the membrana tympani, occasionally by the appearance of the membrane alone. I am very strongly averse to frightening nervous children by introduction of a finger into the nasopharynx, unless this be absolutely necessary, and prefer, in such cases, to diagnose as above and put them under chloroform preparatory to operating. When so diagnosed, I have never failed to find vegetations at the operation. This appearance of the membrana tympani is simply that of an indrawn membrane with marked posterior fold and fore-shortened handle of hammer. Often such a membrane is more than naturally injected. These cases, if deaf, can always have their hearing temporarily improved by inflation, and their hearing rapidly improves after operation and keeps well. The membrane also soon assumes a better or a natural position.

2. *They induce recurrent attacks of acute perforating middle ear catarrh*. And next to their first method of causing deafness, just described, this second form is most favourable from a prognostic point of view. It is very common. The prognosis is fairly favourable owing to the fact that the membrana tympani of children ruptures so easily as the result of acute inflammatory exudation into the middle ear, and to the additional fact that the inflammatory contents of the middle ear usually escape in them through a small perforation; also, because a perforation when once so made re-opens as a rule easily during subsequent attacks and often almost painlessly. No doubt each such attack makes the hearing less likely to afterwards return to natural, and as the result of many such we often have adhesions formed.

Still it is remarkable how often the hearing, by appropriate treatment, after removal of the vegetations can be brought to normal, and how it remains there, sometimes no doubt leaving permanent and decided changes in the appearance of the membrano. An indrawn membrane with posterior fold is usually present in those cases. These attacks of recurrent acute inflammation are no doubt induced by Eustachian blocking as described above. In other words, the middle ear is placed in an unnatural condition, and is therefore predisposed to inflammatory attacks. They may be caused also by the passage upwards of catarrh from the nasopharynx without necessarily a chronic state of Eustachian blocking. Often children exhibit in one ear the features described under the first head, and in the other the signs of acute middle ear catarrh.

3rd. *By inducing recurrent subacute middle ear catarrh.* I have thought it best to describe this form separately, because my own experience has taught me to separate it from both acute and chronic catarrh, partly for prognostic reasons. These cases can as a rule be easily recognised from the appearance of the membrana tympani. It is thickened, opaque, and often altered in colour, being either pink or flesh coloured and at parts yellow.* The yellow appearance is generally confined to the post-segment and is either due to deposit in the membrane or to deposit in the middle ear. The membrane as a whole is more concave than natural, often almost cup-shaped, *though often concave in its anterior half and much narrowed in its posterior half, with the handle of the hammer directed backwards and often in a line with a pronounced anterior fold*, but these cases as a rule show no posterior fold. The light cone is altered or absent. An appearance in these cases, which is very characteristic, *is the distinctness of the tympanic ring at its inferior* and often also its posterior margins. The inferior margin of the membrana tympani presents, owing to this, a *curious opalescent crescent*. This appearance seems to me, from examination of living specimens only, to be due to the margins of the membrane being pulled inwards and attached more or less closely to the inferior and posterior walls of the tympanic cavity, by organised exudation which has collected in the angle of junction of the membrane and these walls. It is this I believe that gives the membrane its peculiar deep cup-shaped appearance, and that causes so distinct a narrowing of the distance between the posterior margin of the membrane and the handle of the hammer, together with absence of a posterior fold. The prognosis, even after removal of the adenoids, requires to be very guarded. These cases seldom or never improve without prolonged subsequent treatment and sometimes resist all ordinary treatment, though bone conduction remains excellent. They are serious, I believe, because the catarrh has in the first instance not been sufficiently acute to lead to rupture of the membrane, the exudation has not found outlet, has been in part organised around and upon the chain of ossicles, and has caused clogging of their joints; but in addition to this clogging of the chain of ossicles, the exudation which has become organised, as I believe, at the angles of junction of the membrane and the tympanic wall, has a most serious effect upon the conducting mechanism for sound. Each successive attack has added to this clogging, and has in addition caused thickening of the membrane. If acute catarrh becomes superadded, great and often prolonged ear-ache results before the thickened membrana tympani ruptures, and it is in cases like this that one gets an opportunity of puncturing the membranos of children; for, as said before, a previously healthy membrano bursts so

* The discolouration indicates as a rule a recent attack.

readily in them that an opportunity seldom occurs for paracentesis. I have come to think that in obstinate cases of this nature the best thing that can happen to the child is an attack of acute catarrh treated by paracentesis, as the acute inflammation causes absorption of some of the inflammatory products, and if the exudation is given exit sufficiently early, it has not had time to increase the damage already done. Attacks of recurrent subacute catarrh, due to adenoid vegetations, can be explained in the same way as attacks of acute catarrh: they are sometimes unilateral.

4th. *They induce chronic middle ear catarrh.* This is not uncommon, and although the prognosis of this form requires to be guarded, it is on the whole less unfavourable than for cases of subacute catarrh. It may almost indeed be said that given a cause of chronic middle ear catarrh associated with adenoids, and in patients below the age of 16 or 17 the prognosis is favourable; after that age more doubtful. The deafness is as a rule bi-lateral. The appearance of the membrana tympani is distinctive. It is indrawn less than in cases of simple Eustachian blocking, it is whitish-grey in colour and opaque, and the light cone is altered or absent. The posterior segment is often narrowed, and a posterior fold is not so constant as in cases described under the first head, though one prefers to see it. There will be little or no improvement as the immediate result of the removal of the adenoids, but Politzerisation or catheterisation persisted in for weeks and perhaps months is, as a rule, productive of much good, and has often in my hands restored natural hearing. The vegetations evidently cause this form of deafness, by placing the mid-ear in unfavourable circumstances, and also, no doubt, by keeping up constant slight nasopharyngeal irritation and, by continuity, chronic Eustachian and mid-ear irritation. It seems to me that the Eustachian tubes remain somewhat more patent in these cases than in other forms, and as a result a better continuity is established, and chronic changes occur in the middle ear without the membrane being markedly indrawn. The history of these cases is, in fact, that of simple middle ear catarrh, except that the adenoid vegetations have to be removed to begin with, as being the initial cause.

No hard and fast line can be drawn between these four varieties of ear trouble associated with adenoids. Mixtures of them of course occur, but to divide them thus simplifies to my mind our work, and is therefore of advantage. Short notes of three cases will give interesting support to the opinion I have formed, and will subsequently express, regarding the way in which adenoid vegetations most commonly cause deafness by simple Eustachian blocking.

One, a case of unilateral deafness caused by adenoids; another, a case where adenoid vegetations occupied the upper third and nearly one-half of the central post-nasal space, without producing any deafness whatever; and a third, where they occupied a very small portion of the post-nasal space in a special manner and caused deafness.

M. D., a girl aged 16 years, and living some 60 miles from Brisbane, consulted me while on a visit to town regarding deafness in her right ear. It had been noticed during the last eighteen months, and attention had been called to it by pain followed by discharge. This discharge continued for six months and then ceased. She had no professional treatment.

Complains of constant drumming sound in right ear. Thinks she has natural hearing in left ear. Tuning-fork heard on right side from vertex—not by air. On left side as by normal ear. Politzer's acoumeter not heard except by bone conduction on right side; by left ear hearing to acoumeter and watch natural.

Examination.—Left ear membrane shows very slight posterior fold, otherwise healthy. Right ear membrane opaque and indrawn, marked anterior fold, and much narrowed posterior segment. Point of handle of hammer directed inwards, and whole handle foreshortened. Membrane moves to Siegel's air-pump, though not well; even the handle of hammer moves a little. After the use of Siegel's air-pump the acoumeter was heard at 2 inches.

Pharynx.—A few small granulations of an adonoid nature on posterior pharyngeal wall.

Naso-pharynx.—Adenoid vegetations growing from roof. They were not felt, but looked to be of firm consistence. On the right side they lay in contact with the pharyngeal surface of the Eustachian tube, and extended downwards to the upper margin of its orifice. Whereas on the left side, there was a distinct deep sulcus separating them from the pharyngeal surface of the tube. This sulcus appeared to extend upwards to the pharyngeal roof. The lower margins of the vegetations extended on the left side to a level slightly above the upper margin of the Eustachian orifice. The sulcus seemed to be from $\frac{1}{8}$ to $\frac{1}{4}$ -in. in width.

Anterior Nares.—Small horizontal enchondrosis in each nostril, that on the right side being somewhat the larger, but the nostril was not narrowed detrimentally by it, as a view of the post-pharyngeal wall could be obtained through the right inferior meatus.

Politzerisation sent the air very imperfectly into the right ear, better but not well into the left. As an immediate result, she heard the acoumeter with her right ear at 4 yards, and its membrane was distinctly in better position. It seems hardly necessary to remark upon this case. Its facts are so conclusive, even to the improvement upon Politzerisation. The patient was unable to remain in town for operation, which I advised. However, she was chiefly interesting to me, from the facts obtained at her one visit. I warned her of course that the improvement produced in her right ear would only be temporary, but considered myself justified in giving a hopeful prognosis in the event of her submitting to operation and treatment.

The two other cases may be given together more shortly, they illustrate the same point.

A boy, D.C., aged 9 years, was brought to me by his parents from an inland town. They complained that he was constantly clearing his throat, and was troubled with an irritating cough, also that he breathed through his mouth. He looked thin and badly nourished, but wiry. He had lived a healthy out-door life. I had a year previously removed adenoid vegetations from his sister, aged $6\frac{1}{2}$ years. In her they had produced deafness (hearing having been reduced to half the natural). Also, a tickling cough and clearing of the throat. They had been sessile on the roof of her pharynx, hiding only the base of the septum in front, but extending laterally to close contact with the pharyngeal surfaces of the Eustachian tubes. Her membranes presented the appearance mentioned under variety of deafness No. 1, though not to at all an extreme degree. Upon examining the brother's nasopharynx, adenoids were found growing from its roof, and extending downwards to hide nearly half of the septum. There was, however, a distinct sulcus on each side between them and the pharyngeal surfaces of the Eustachian tubes. This extended up to the roof, and seemed at least $\frac{1}{8}$ to $\frac{1}{4}$ -in. in width. He allowed me to obtain an excellent view.

Upon examining his ears, I found both membranes healthy in appearance, though each had the very faintest indication of a commencing posterior fold.

I was sure from this examination that he would have almost if not quite natural hearing, and his parents had noticed no deafness. Upon testing him, which, contrary to my custom, was done after the above examination, I found that he had perfectly natural hearing on each side.

From these and similar cases I have thought it probable that adenoid vegetations are more likely to produce ear symptoms when they lie in close contact with the pharyngeal surfaces of the tubes, and that they do this by obstructing the return of blood by the venous radicles of the pharyngeal plexus, and so by causing passive congestion of the Eustachian tubes. And small vegetations, especially if of dense consistence, stretching across the pharyngeal roof and coming on each side in close contact with the pharyngeal surfaces of the tubes cause, in my experience, ear symptoms much more constantly than much larger and softer vegetations which, on account of their distribution and consistence, press less firmly upon the tubes. But nevertheless the kind of deafness caused by this close contact of the vegetations with the tubes, is generally of the varieties 1 or 2 described above, sometimes, though fortunately not frequently, of the third variety, and therefore, as a rule, yields pretty readily to treatment. But I have come to believe that chronic middle ear catarrh is often associated with adenoids which do not cause so much Eustachian obstruction, and which, therefore, probably cause deafness by the spreading of catarrh from the naso-pharynx to the middle ear up somewhat patent tubes. At the risk of trespassing too much upon your patience, I must record shortly two other cases illustrating the third variety of deafness. One, that of a boy aged 13 years. History—deafness in left ear ever since can remember, never pain or discharge. Examination—conduction by bones on left side good. Hearing for tests, right ear half the natural. Left ear, Politzer's acoumeter only at 4 inches (should be heard at 16 yards) and watch only by mastoid (should be heard at 4 yards). Left membrana tympani presents appearance described under subacute middle ear catarrh, except that it is slightly translucent and shows by coloration no sign of recent deposit on its deep surface. The right membrana tympani is slightly opaque and indrawn as if from Eustachian blocking.

Nasopharynx.—Showed adenoids from roof firmly in contact with pharyngeal surface of tube on left side, barely in contact on right side. They descended to upper margin of tubal orifice on left side. Slightly less far on right. They also occupied Rosenmüller's fossæ—especially on left side.

Anterior nares.—A small horizontal enchondrosis on left side. I gave a very guarded prognosis as regards left ear. But advised removal of the adenoids for the sake of the lad's general health, and for the sake of almost certain improvement in the case of the right ear. The adenoids, which proved to be unusually tough, and the enchondrosis were both removed under chloroform. The right ear quickly improved to natural hearing. But prolonged treatment has only improved the left very slightly, and that in spite of the fact that by catheterisation and latterly bougies the Eustachian tube has been rendered very patent indeed, and I can auscultate very clearly forced nasal breathing past its orifice by means of the otoscope. This latter being a physical sign that I frequently make use of and find of value.

The second case is that of a boy aged 6 years :—

History.—Deaf and dumb since 2 months of age. Naturally a sharp boy. Parents think he can hear a very loud sharp sound such as a gun going off close to him, and that he says "Ma" indistinctly.

Examination.—Bone conduction good as far as could judge. Membranes typically those described under variety 3. The crescentic appearance at the inferior margin being very distinct and the handle of the malleus being practically in a straight line with a prominent anterior fold in each, and the posterior segment very narrow and showing no posterior fold. Adenoids found. Guarded prognosis, but advised to have adenoids removed. They filled quite two-thirds of naso-pharyngeal space, and grew from the roof and fossæ of Rosenmüller, and pressed closely on the tubes. They were found when operating to be unusually tough. The boy has now been under treatment since the operation for some six months. He has improved in general health and has a more natural appearance. Can have his attention attracted by calling his name loudly at some 4 or 5 feet distance, or by a loud sound. Can hear and attempts to imitate musical sounds, and the sounds that dogs and cats make, and points in a pleased manner to his ears when he distinguishes any unusual sound by them. Makes sounds now to attract people's attention, instead of as formerly attracting them always by touch. Calls his mother "Mama" and the cat "puss," but apart from these sounds only occasionally says a word which seems to be intelligible and when asked to repeat it will very seldom do so. Has more than once said "Peter," his own name, distinctly after me. His Eustachian tubes are more patent, but still not natural. His membrana tympani have improved as far as translucency and movement to Siegel's air-pump are concerned, but otherwise not. I shall persevere with him for some months. And contemplate operative procedure if ordinary treatment should fail. As an instance of his acute bone conduction his attention can be most easily called by a stamp on the floor of the room even at a great distance. This has always been the case.

Case of Parasitic Disease of the Pharynx.

JAMES ADAM DICK, M.D., C.M., Edin.

IN this case the patient, who is a young, strong, healthy man, had his attention called to his throat about five months ago. He then noticed a rough grating sensation on moving his tongue, and upon examining his throat he saw two small white patches vertically arranged on the right side behind. Probably the spots had been there for some time before they were noticed. Therefore, the affection may be more common than expected. He has complained of no other symptom, on the contrary he is quite healthy, never having weighed heavier or felt better than at present. On examination of the patient there were no inflammatory appearances to be observed in the mouth, or pharynx, or any other part. But on very careful examination of the spaces between the anterior and posterior pillars of the fauces, extending from the palate above to the tongue below, on either side there were to be seen a few small scattered excrescences, some of which were coloured white, others were white with black summits. These spots or excrescences or nodules are found to vary from 2 to 3 millimetres long and from 1 to 2 millimetres thick. They are hard, and present a horny sensation to the touch. They are not stony or chalky. It is very difficult to dislodge them from their position, especially those that are located in the crypts of the tonsils, which organs are not well developed in the patient. When first seen, the nodules appear as small, scattered, white dots the size of a pin's head, and might easily suggest diphtheric patches, some of the spots appear to coalesce, later on the dots grow into nodules and their summits assume an inky black appearance. The largest nodule removed has been the size of a double-pica letter O, and there never have been more than five on the same side at one time. Microscopic examination of the nodules has shown that they are composed of a vegetable parasite between the mycelial threads of which are numerous hard epithelial squames. The black colour of the summits of the nodules is apparently due to black spores. I have not had an opportunity to make any cultivation experiments. Dr. John Gibson, who has kindly examined the preparations, considers the fungus to be an aspergillus, probably *aspergillus nigrescens*. Ordinary antiseptic applications have been applied, notwithstanding which the nodules recur. Of late no energetic measures have been used, in order that the patient could be exhibited before the Congress. Unfortunately for exhibition purposes there is exceedingly little to be seen at the present time. On looking up the literature of this subject I find that parasitic disease of the mouth and pharynx in this form is agreed by writers to be rare. Morell Mackenzie does not bestow much attention to the subject. Lennox Browne, in the third edition of his work, "considers fungoid disease a rare affection, he has only seen a few cases, and in every case leptothrix was the prevailing parasite present." MacBride describes a parasitic affection of the pharynx under the term pharyngomycosis. He does not mention that he has met with any cases. Ziemssen's Encyclopædia contains an article by Frankel on the subject, but there is nothing special in it. Rutlin, in his "Diseases of the Tongue," describes the so-called "Black tongue," but does not mention parasitic disease of the

pharynx accompanying it. Schech, in his "Diseases of the Mouth, Throat, and Nose," gives the best account of parasitic throat affection under the term "Pharyngo-mycosis Leptothricia," he describes cases very similar to the present. He speaks of "whitish or gray, soft or horny, pedunculated tubercles or thorn-like excrecences, affecting the tonsils alone, or along with the base of the tongue, causing severe or trivial symptoms. These tubercles microscopically examined are found to consist of numerous organisms which have not yet been named. In one case the nodule consisted wholly of *bacilli and roundish cocci*; in another case, published by Eugen Frankel and analysed by Sadobek, a *bacillus* was found *appearing in tufts*; and in six other cases Hering came to the same conclusion as Klob, that the fungus mass consisted of leptothrix." All authorities agree not only in the rarity of similar parasitic affections, but also in their obstinate persistence and usual innocence. For further treatment I propose to thoroughly curette the parts and apply strong bichloride of mercury solution, failing that the cautery will be used.

Hypertrophy of the Lingual Tonsil.

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HYPERTROPHY of the lingual tonsil is now recognised as a distinct pathological condition, producing symptoms which are, for the most part, tolerably definite and pronounced, and which can always be effectually relieved by appropriate treatment.

The term "Lingual Tonsil" is applied to the collection of lymphoid tissue found in the epiglottidean fossa, which occupies the posterior third of the base of the tongue. This space is bounded in front by a line—the "sulcus terminalis"—which, for all practical purposes, corresponds with the V-shaped line of the circumvallate papillæ, the latter standing out, as Wingrave remarks, like a series of martello towers guarding a region sacred to the laryngologist. This sulcus may not always be visible, but the papillæ are, unless destroyed by disease. The histology of these lingual tonsils has quite recently been invested with some considerable interest, since Wingrave demonstrated only a few months ago, that though they are clusters of lymphoid tissue they contain crypts or lacunæ, lined with well-defined columnar ciliated epithelium.* This is a most interesting discovery, as ciliated crypts have never been previously noticed, they are not found in the faucial tonsils, and they evidently illustrate, as Dundas Grant points out, the persistence of a foetal condition. I have, however, up to the present, failed to discover any of these ciliated lacunæ in sections made for me. Solis-Cohen objects to the term "tonsil" being applied to these lymphoid bodies, and thinks it should not be used for any save the faucial tonsils proper; but, nevertheless, most writers now use the expression and apply the word "tonsil" indiscriminately to the lymphoid collections found on the tongue, in the naso-pharynx, and to the faucial tonsils alike.

Next, let us consider the pathological conditions peculiar to hypertrophy of the lingual tonsil. On examination the growths on the tongue are found overlapping the epiglottis, more or less, and thus rubbing against its sensitive laryngeal surface. This is what is described by Solis-Cohen as "imprisonment of the epiglottis." When the growths are sufficiently large so as to overlap the interior of the epiglottis to any considerable extent, and thus to rub against this extremely easily-irritated area, then the symptoms commence, coughing is provoked by the irritation, in fact a struggle between the two parts involved begins, and thus by-and-bye the coughing itself acts as an irritant, which in turn intensifies the original trouble, and the "vicious circle" is thereby completed. In this connection it may be mentioned that the epiglottis is sometimes asymmetrical, and this is shown by Rice, of New York, to be a predisposing cause to its entanglement by the lingual growths. He has pointed out that one angle or one half of the summit of the cartilage may be prolonged beyond the level of the other, the prolongation sometimes ending in a well-curved border and sometimes extending to a point.† The commencement of the asymmetry is congenital, and no discomfort ensues

* *Journal of Laryngology*, May, 1892, p. 213.

† *N. Y. Med. Record*, May, 1886, p. 493.

until the elongated portion begins to come in contact with the neighbouring tissues on the tongue, then, by constant contact and friction, the enlargement of the epiglottis becomes actually greater, through chronic inflammatory thickening, and, here again, another "vicious circle" is completed. I have found the epiglottis asymmetrical in a fairly large proportion of my cases. Lastly, varix of the vessels at the base of the tongue is often found to co-exist with hypertrophy of the lymphoid tissue, the two constituting the condition designated by Lennox Browne "throat piles."

THE ETIOLOGY.

The etiological factors in the production of this over-growth of the lymphoid tissue at the base of the tongue are, according to Lennox Browne, identical with those leading to enlargement of the faucial and pharyngeal lymphoid glandular masses, viz.:—The contamination of the buccal fluids by micro-organisms and their irritating chemical products—the result of their life processes—in association with rheumatic or other diatheses. This extract briefly sums up my own experiences. I have found both indigestion and rheumatism, either separately or together, to be the commonest accompaniments of this abnormal condition of the tongue. In quite a large number of my cases I have discovered rheumatism developed, or an inherited tendency thereto, and also the uric acid diathesis was found to co-exist. Then, as an outcome of these diathetic vices, or independent of them, indigestion in various forms is complained of. Again, some authorities, as Curtis and Lennox Browne, regard improper use of the voice as a local cause of the trouble. It is not by any means of uncommon occurrence among singers, because they, not unfrequently, either adopt a wrong vocal method in their singing, or sing when their voices are not fit to be used.

As to age:—Hypertrophy of the lingual tonsil is rare in children, but common in young adult life, when other lymphoid developments, such as the pharyngeal tonsil, begin to undergo spontaneous degeneration. Amongst my cases the youngest is 19 years, and nearly 50 per cent. of them range between this age and 30 years. The oldest subject I have had is 72 years, but only comparatively few seem to be found much over 55 years.

Next as to sex:—Females are undoubtedly more liable than males. Out of my ninety cases, I find nearly two-thirds are women, and in them the condition is often associated with menstrual irregularity. For instance, menorrhagia, this more especially when varix of the tongue exists, and the symptoms then are usually aggravated at the menopause. Lennox Browne thinks the reason why females are more liable is because in them the vasomotor system is generally more debilitated than in the male sex.

The symptoms are nearly all subjective and pretty constant, they are as follows:—Irritation of the upper part of the pharynx variously described as a pricking sensation, or that of a hair, crumb, or fish-bone in the throat. This is accompanied by a feeling of tightness and fulness, which sometimes extends upwards towards the ears, and usually gets worse towards evening. Lennox Browne uses the term "pharyngeal tenesmus," and applies it to those cases in which there is this feeling of tightness, accompanied by a continual inclination to swallow some imaginary foreign body, producing more or less cough, straining, and pain. These symptoms have not, up to lately, been acknowledged to have other than a neurotic basis, they have been all grouped under the familiar "globus hystericus" group, while all the time a real objective cause—hypertrophy of the lingual tonsil—existed to produce, or, at any rate, to aggravate them; and from my own personal

experience I can affirm that symptoms of this kind are frequently put down to the groundless fears of an imaginative or hysterical hypochondriac, and treatment refused or neglected, which, if adopted, would have removed them all and cured the individual. Oesophagismus may also be mentioned in this connection as having occurred and found to depend upon similar causes. Cough, often very troublesome and irritating, or what is known as a "useless cough." In two of my cases the cough was the prominent symptom, and resembled, as far as I can tell from reading the description of it, the "Barking Cough of puberty," described by Sir Andrew Clark.* The voice is easily tired when any continuous effort is made, after talking a short time it gives away and hoarseness comes on. But it is in singing that this symptom is usually most marked. After the patient has been singing for a few minutes he begins to feel his voice crack on a certain note or notes, and he cannot, without great effort, get these notes out, even then the effect is far from what it ought to be, and he is supposed to be suffering from a bad cold, &c. This unusual effort and the straining which it induces still further increase his trouble each time he sings, so that soon a chronic pharyngeal and laryngeal catarrh is set up, and then the timbre of the voice, which depends so much for its quality upon the health of the throat, becomes seriously impaired. Here the faulty position of the epiglottis also comes in, limitation of its movements must cause some perceptible defect in the singing, because the epiglottis plays such an important part in the formation and modification of the voice; and it (the epiglottis) takes different positions during vocalisation in changes of pitch, quality, and intensity. From observations I have been able to make, I think it is usually on notes in the higher register that the voice gives way. The position of the epiglottis during the formation of these notes might serve to account for this. Soprano voices in women and tenor in men seem to be oftenest affected. I have had lately two prominent tenors under treatment, whose singing was sadly impaired by imprisonment of the epiglottis or some such cause connected with enlarged lingual tonsils, and they are now quite restored to their usual form by removal of the growths. Amongst some occasional symptoms met with, hæmorrhage from the throat may be mentioned, either spontaneous or induced by application of the brush, and when spontaneous it may be mistaken for pulmonary hæmoptysis. Lennox Browne has found that taste of blood in the mouth on awakening from sleep is often complained of, and a common system of varix at the back of the tongue, depending on actual venous leakage.

One word as to diagnosis: Having the symptoms as just enumerated prominently before your mind and having, by a process of elimination, excluded irritation of other sensitive areas in the neighbourhood as a cause, it only remains to prove that the back of the tongue and the epiglottis are the seat of the trouble, by touching the parts with a probe; the patient will then recognise the location as identical with that of the seat of the irritation, and the same cough will be produced. The application of cocaine, by removing the tickling, will still further help the diagnosis.

LASTLY, THE TREATMENT.

First.—Constitutional.—It is of primary importance to recognise and treat the underlying constitutional and exciting functional, and other causes. If rheumatic symptoms are present they ought to be treated. Tenderness on pressure over one or both thyro-hyoid ligaments can frequently be

* *Brit. Med. Journal*, Dec., 1890.

elicited in examining these cases, and this, while serving to show the connection between the general and local rheumatic condition, points more decidedly than ever to anti-rheumatic remedies as a necessary part of the treatment. Of these remedies I have found Salol to suit best when the throat is involved. Bartholow says, "The effects of salicylic acid are increased in all directions by members of the phenol group."* This probably explains why 90 grains of Salol will do more work in rheumatism than the 50 grains of salicylic acid it contains. Gougenheim recommends Salol in doses of not less than 4 grammes (60 grains) daily. *Second—Local Treatment.*—There are various methods recommended for removing the growths, some use cutting instruments, curettes, guillotines, &c., and others the galvano-cautery. I have had a sharp curette made (*exhibited*) with which I have sliced off the larger growths, but I usually use the galvano-cautery, it is the most convenient to apply and gives the most satisfactory results. In applying the cautery it is necessary to guard against touching the epiglottis with the point, as an eschar on its border causes a very troublesome and irritating sore for some time, accompanied sometimes by considerable swelling of the cartilage, dysphagia, &c. In order to avoid this unpleasant complication it is advisable to have the parts thoroughly cocaineised, to have the tongue well pulled out and held out, and to make the application as quickly as possible, so that the patient may not be tempted to swallow, which he should be instructed to avoid doing during the time the point is in contact with the tongue. The point is applied at a good white heat to the centre of each of the larger growths in succession, an indentation is thereby made into the growth, which, when healed up and drawn together, reduces its size considerably, a second and even a third application may be necessary, or in some cases the first cauterisation may be followed up after the end of a few weeks, by daily application of Mandle's or some similar solution.

In conclusion, I would just mention the importance of special and proper training of the voice, not only as a preventive, but as a curative agent. All singers who suffer in this way should be placed under the supervision of teachers who know how to make them use their voices in the best way, and with the minimum amount of strain on their throats.

* *Therap. Monatsheft*, 1887, p. 51.

Combined Vapour-Inhaler, Tympanum Inflator, and Nasal and Aural Insufflator.

Devised by H. PAYNTER SLOGETT, M.R.C.S., Eng. L.K.Q.C.P., Irel., Dip. State Med.

THE demonstration of this apparatus was, owing to the inventor's absence, not given; but the following are extracts from his notes on the subject. "This little apparatus was devised as an auxiliary in the treatment of various middle ear affections and associated morbid conditions of the throat and nose—it, in fact, affords a simple and effective means of applying volatile remedies in a vapour form to the mucous membrane of the entire respiratory tract, including those diverticula which extend by way of the Eustachian tubes into the middle ear.

"The essential portion which I originally used as a vaporiser—accessory to Politzer's bag, is a hollow cylindrical case of thin metal with a screw-on cap, and at each end a good-sized perforation with incurved edges. The end of the cap is ovoid, the better to fit the nostril. Within the box is a roll of absorbent paper folded so as to offer a large surface for volatilisation without impeding the rush of air, this is to receive the desired medicament in a liquid form. A thin glass cylinder (with incurved ends), which exactly fits the interior of the box, and itself holds a similar roll of absorbent paper, is to replace the roll in the metal case when the medicament used is such as acts chemically upon the metal. About 9 in. to 10 in. of rubber-tubing of $\frac{1}{4}$ -inch calibre is attached to the end of the metal case, and the free end of the tubing slips over the nozzle of Politzer's bag.

"A glass mouth-piece attached to the free end of the rubber tubing renders the apparatus an *auto-inflator of the tympanum* by means of which a patient can inflate his own tympana with the vapours of suitable volatile remedies applied to the absorbent paper within the metal case. To do this he has only to adjust the conical end of the metal case to one nostril, close the opposite one with pressure of the finger, and blow—a smart puff—through the mouth-piece; the muscles which raise the soft palate to cut off the air current from the nose in the act of blowing through the mouth simultaneously opening up the cartilaginous portion of the Eustachian tubes.

"By means of the same little contrivance similar vapours can be applied to the whole mucous lining of the naso-pharyngeal cavities, the patient blowing gently and continuously through the mouth-piece and inserting the nose-piece into one nostril, leaving the other nostril unclosed. Such application can be continued for a considerable time without fatigue or inconvenience, and in different forms of nasal catarrh, ozæna, and coryza I have found it both beneficial and comforting; stimulant, sedative, antiseptic, or alterative remedies being used according to the indications."

The author then proceeds to note its use as a dry inhaler, and as a steam inhaler, also as a powder insufflator, and gives formulæ which he has found of service in connection with the apparatus.

Discussion on Adenoid Vegetations.

AFTER the reading of the foregoing papers on the subject the following discussion on adenoid vegetation in the naso-pharynx took place.

Dr. James W. Barrett, Melbourne, Vice-President, occupying the chair.

Dr. T. K. Hamilton (Adelaide, South Australia) said that adenoids are very common in South Australia. He did not believe that a damp climate is necessary to their development. He had seen as many cases from the dry regions of the interior as from coastal localities. A disease so extensively prevalent in Europe and Australia must owe its cause to other than climatic causes. He believed that a depressed condition of the general health is a cause. He has a theory that the naso-pharynx being intimately connected with the digestive tract is influenced by conditions of the latter. The injudicious feeding of children which takes place in Australia may thus account for the enormous number of cases seen in this country, where the climate ought to be unfavourable to their growth. He believed struma to have no connection with the disease. The youngest child on which he had operated was aged 10 months. In children of such tender years he hesitated to introduce the finger alongside the instrument with which he removes the growth, as, on account of the narrowness of the space, he thinks it possible to inflict injury—possibly to fracture the Hamular process. His experience as to the recovery of normal hearing in most cases operated on before 13 years of age has not been so favourable as that of Dr. Lockhart Gibson. Speaking of the question—"When is it necessary to operate"? he said that he followed the maxim of Stoker, "if there is any interference with any physiological function, be it ever so little,—operate." He always operates under anæsthesia, using the A.C.E. mixture. Patient on back with hanging head, which not alone prevents blood entering air passages, but renders anæsthesia safer by allowing air to more freely enter the glottis. He uses Woakes's modification of Löwenberg's forceps. He entirely disagrees with Dr. Gibson's opinion that the eurette is a dangerous instrument. Gottstein's eurette is quite safe when skilfully used. He does not think that adenoids grow in Rosenmüller's groove. Believes deafness to be caused rather by paresis of tubal muscles and lymph stasis, than by mechanical obstruction. If Politzerisation gives distinct improvement of hearing before operation, the prognosis is favourable. As a diagnostic sign if the soft palate is fixed "juicy" adenoids are almost certainly present. The rhinoscopic mirror is the best means of diagnosis in a very large proportion of cases. He thinks it would be well if all deaf-mutes in asylums were systematically examined for post-nasal growths. He has never seen a fatal issue or serious symptoms follow the operation. He has only once seen acute middle ear catarrh as a result. He is careful to have all instruments aseptic, and uses cotton wadding swabs, not sponges.

Dr. Hozier (Sydney) mentioned thickening of the faucial pillars, and the impossibility of sending a spray of liquid vaselin into one nostril and out of the other as additional symptoms of the presence of adenoids. He thought Dr. Gibson's steel nail would interfere with the sense of touch. He said it would be interesting to determine if adenoids and Tornwaldt's disease, which at present is much spoken of in Germany, were the same disease at different

periods of life. In operating uses Löwenberg's forceps and Gottstein's curette. Finds the growths very common. Has never seen serious symptoms follow the operation for their removal.

Dr. Kenny (Melbourne) said aprosexia exists in a large proportion of cases. He prefers digital examinations to the mirror as a means of diagnosis. Invariably operates under chloroform with hanging head. He finds that he cannot remove the growths sufficiently thoroughly without general anæsthesia, and that they consequently return. The hanging-head position is the most convenient for the surgeon. He has complete anæsthesia produced, keeps mouth open with Ferguson's gag, uses Woakes's modification of Löwenberg's forceps to remove growths. Completes removal with Gottstein's or Hartman's curette. Believes this curette is always perfectly safe with those who know the anatomy of the space. He finds the finger-nail answers the purpose of removing the growths which Dr. Barrett removes with small curette through anterior nares. He uses subsequent douching with antiseptic solutions, and keeps patient in bed two or three days. Finds acute middle ear inflammation a frequent sequel of the operation. At the Golden Square Hospital, where Politzerisation was commenced soon after the operation, this complication was very frequent. He uses sponges, but is careful to keep them aseptic. Finds the disease most common in coastal districts. Except middle ear inflammation, he has never seen any evil effect follow operation.

Dr. Nihill (Melbourne) saw a case of adenoids in a child aged 6 months. Child could not take the breast from inability to breath through nose; after operation this symptom disappeared. As symptoms of the disease, he mentioned the trickling of mucus down the post pharyngeal wall, and reflex cough. He operates under chloroform, administered to full anæsthesia, in hanging-head position using Woakes's forceps. Although he has never seen antiseptics thoroughly carried out, he has never seen any evil result follow operations. Finds adenoids a very common disease.

Dr. Kenna (Sydney) mentioned Chiari's diagnostic test, which is to look through the nose with a speculum, while the patient phonates E the soft palate raises the growth up and brings it into view.

Dr. A. J. Brady (Sydney) could not agree with Dr. Gibson that the eurette is a dangerous instrument to use in the removal of adenoids. In operating, the cutting part of the ring knife is swept along the roof of the naso-pharynx from the septum backwards, keeping in the middle line. The knife is thus above the Eustachian cushions, and cannot wound them. He operates on young children under chloroform, with hanging head, using the ring knife for removal of growths. He showed the instrument with which he had thus operated on over a hundred cases. He had never seen it inflict injury to the Eustachian cushions. In a large proportion of his cases he used cocaine anæsthesia only. Most children over 10 or 12 years of age were thus dealt with. The soft palate was tied forward with two rubber tubes through the nose; and using a forceps of his own design, with fenestrated blades with a large cutting surface, under the guidance of the mirror the growth was seized and removed. The advantage of the large cutting forceps was that the major portion of the growth was removed at the first cut, so the surgeon's view was not obscured by the bleeding. Several sittings are generally required, and the growths can thus be radically removed. He had, under chloroform, sometimes used the Vice-President's method of removal, with the finger-nail, but preferred the curette, breaking down remnants of growth with finger-nail. This was a rapid method, occupying less than a

minute, as compared with a quarter of an hour which, Dr. Quaife said, removal by forceps required. The rapidity was important where tonsillotomy had to be performed under the same anæsthesia. He had chloroform administered to full anæsthesia, as under partial anæsthesia the spasmodic contraction of the soft palate prevented the delicacy of manipulation. In his experience acute otitis media was a very unusual sequel of the operation, he had never seen suppuration of middle ear follow it. He condemned early Politzerisation after operation, as being likely to drive septic secretions into the middle ear. He only began inflation when the naso-pharynx was healed. He believed hereditary influence and climate to bear a large share in the production of the disease. Nearly all his cases had come from coastal districts. He has seen none from the dry inland plains. He had never seen serious complications or a fatal issue follow the operation of removal of adenoids. The disease was very common in New South Wales.

Dr. W. F. Quaife (Sydney), in reply, said that he found tape better than rubber tubing for tying the soft palate forward, as the knots of the latter slipped.

Dr. Lockhart Gibson (Queensland), in reply, has seen quite as many cases of adenoids from the dry regions in Queensland as from the coastal ones. Did not consider anterior nasal obstruction as being sufficiently common to account for adenoids. Agreed with the Vice-President that struma is not a cause. Holds that his steel finger-nail has distinct advantages, as in its use the naso-pharynx is not crowded with an instrument and finger at the same time. He frequently uses the rubber tubes to tie forward the soft palate when operating without chloroform, and he finds that they answer well. He uses posterior rhinoscopy in preference to digital examination. Seldom fails even in young children. It is important not to alarm them, so he depresses the tongue with the index finger instead of a spatula. He had only once seen acute middle ear catarrh follow the operation for adenoids. Has never seen a fatal issue. Does not begin Politzerisation for two or three weeks after operation. Adenoids are common in Queensland.

Dr. Barrett, Vice-President, said that the discussion had been a very profitable one, certain broad facts had been elicited. He has asked each member taking part in the discussion to state his experience of the prevalence of the disease in his locality, its influence in causing deafness, and whether he had seen any serious or fatal results follow the operation for the removal of adenoids. All were agreed that the disease is very common in Australia, that it is the cause of a large proportion of the cases of deafness which exist, and no fatal case had occurred in the practice of any of them; so that the risks of the operation for the removal of the growths with proper precautions seem to be nil. He has seen the growths return where he had satisfied himself by after examination that the removal had been thorough in one case three times. When the patient is again exposed to the same conditions which first caused the disease it is not to be wondered at that a relapse sometimes takes place. He could not agree with Dr. Quaife that the pharyngeal tonsil is ever affected with the same swelling as occurs in acute inflammation of the faucial tonsils. The after treatment of cases after operation is very important. Cleansing with weak alkaline solutions ought to be carried out. The treatment is never complete till all obstructions in the anterior nares have been removed. He then sends the patient for a time to a dry climate to complete the recovery. In reply to a member, he said he used the middle finger, in preference to the index, in the removal of adenoids, because it is the stronger. The fact that all the specialists practise in the big

coastal cities might explain the apparent preponderance of adenoids in coastal regions in Australia, as cases from the interior would not be so likely to come under their notice.

At the second day's sitting Dr. T. R. Hamilton read his paper on "Hypertrophy of the lingual tonsil."

Dr. A. J. Brady said we were much indebted to Dr. Hamilton for bringing his experience on this subject before us. It was one, as Dr. Hamilton said, which received scanty notice in the ordinary text-books; and consequently a surgeon meeting with these cases might be in doubt as to the importance of the local changes observed, or as to their influence in causing the symptoms present. He might think (his opinion not being backed up by the experience of others) that, perhaps he attached too much importance to the local abnormality as a cause of these symptoms. Dr. Hamilton's experience in the large number of cases operated on by him would therefore be a valuable help to others working in the same field. He (Dr. Brady) had also operated on a large number of cases. In one case where the hypertrophy was very marked the alteration in the voice was so great that it resembled that of cleft palate.

In his experience the pain following cauterisation of the lingual tonsil was more persistent than in that of Dr. Hamilton. In fact the after effects were more painful than in most other operations in the throat; although he had not, so far as he was aware, at any time cauterised the epiglottis during the operation. He curves the point of the burner sharply forward before introduction, so that it buries itself in the gland, and thus avoids the epiglottis, being on the watch to interrupt the galvanic current the moment the patient gags. The galvano-cautery is the instrument he generally employs. He had found more than two or three sittings necessary to reduce the hypertrophy. If too much was done in a sitting the reaction was too severe. He had tried various cutting forceps, but found the gland-tissue so tough and resistant that they were not very successful. He therefore thought that Dr. Hamilton's cutting curette would hardly be capable of removing these hypertrophies. He would like to know Dr. Hamilton's experience with it.

Dr. Hamilton said that he had not said much in favour of the curette.

Dr. Hozier read his paper on "Nasal disease as a causal factor in affections of adjacent parts and distant organs."

Dr. T. K. Hamilton said that we were on debatable ground on the question of nasal reflexes. Asthma was the most important of all. His experience did not bear out the opinion of Hack that all asthma depends on nasal reflex. Yet there is a large percentage of cases of asthma improved, and a considerable percentage cured by intranasal treatment. The discovery of the influence of the nasal reflexes was an important advance in knowledge. Physicians now rightly consulted specialists in these cases. He objected to give a general anæsthetic for the removal of intranasal growths, as it hampers the operation, increases the bleeding, and embarrasses the surgeon by preventing his getting a good view of the parts. He mentioned a method which was first pointed out to him by Dr. Iredell for the treatment of paroxysmal sneezing, which he had found extraordinarily successful—it was the division of the nasal nerve where it crosses the septum, with the electric cautery.

Dr. Gibson said that he examined the nose as a routine practice in all chest cases. He described a soft swelling on the sides of the septum posteriorly as a cause of nasal obstruction. He ties the palate forward and destroys the growths with the galvano-cautery.

Drs. Kenna and Kenny thought that the condition described by Dr. Gibson is a physiological one.

Dr. A. J. Brady felt sure that the conditions of well-marked outgrowths in this region is not a physiological one. He had seen such a condition produce post-nasal catarrh with very troublesome hawking and snorting. The symptoms disappeared on the removal of the growths. They were sometimes the site of reflex irritation, and they required to be destroyed as part of the treatment of paroxysmal sneezing. As to paroxysmal sneezing, he had frequently seen a relapse take place, after a period of immunity of six or twelve months had followed treatment by the galvano-cautery. Fresh resort to the treatment generally again arrested the symptoms. He would like to know the experience of others on the question of relapses. For the same reasons as mentioned by Dr. Hamilton he commonly operated under cocaine, and not under general anæsthesia for the removal of intranasal obstructions, but he had operated several times under chloroform. He then plugged the posterior nares, and secured the tampon through the sound nostril. He could then operate without any embarrassment from the bleeding, so far as the safety of the patient was concerned.

Dr. Hozier, in reply, said that he approved of the principle of operating without general anæsthesia, but in the case mentioned the patient was so extremely sensitive that it was impossible. He had plugged the posterior nares in this case.

SUB-SECTION.

DISEASES OF THE EYE.

Notes on the practical use of the direct method for estimating refractive anomalies.

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Hon. Ophthalmic Surgeon, Queensland Government Benevolent Asylum.

HAVING learnt by constant use of the direct ophthalmoscope for the last seven years to rely upon it more than upon any other method for estimating refractive anomalies, I am induced to read these notes. They will be entirely practical, entirely based upon my own observations, and will be illustrated by a few of my cases by whose aid I hope to point out advantages which the method seems to possess over others. It will be no abstruse dissertation on optics—I leave such to others more competent.

In estimating refractive anomalies we have to hold in view four things :—

1. Correction of sight to make it approach as nearly as possible to normal.
2. This correction to be made with as little as possible temporary interference with the eye-sight of the patient, *i.e.*, without interfering with his work.
3. The learning while making the examination the state of the patient's fundus.
4. The estimation to be made in as short a time as is consistent with accuracy.

Estimation by means of a good refraction ophthalmoscope seems to me to meet all these desiderata.

I would premise by stating that by the use of no method can the test types be dispensed with—and when possible they should always be combined with direct examination; but I will go so far as to say that if only one method of examination were possible, I should choose the direct ophthalmoscope alone in preference to test types alone. In young children I rely upon the direct method only.

1. Correction of sight to make it approach as nearly as possible to normal.
 - a. The examiner must teach himself, if emmetropic, to relax his own accommodation. This can be done. If not emmetropic he must know his own correction.
 - b. The patient is found, by practical experience, to relax his accommodation almost, if not quite, completely while being examined thus.

Given these two, the glass which gives the clearest view of the fundus is the correcting glass, if the error be a spherical one. If the error be regular astigmatism, the cylindrical glass which gives a clear view of the fundus is

the correcting glass. To find this glass the astigmatic meridian must be estimated as well as the general refraction; but a clear view of the fundus cannot be obtained until the required spherical and cylindrical glasses have been placed in front of the eye; and I know of nothing more satisfactory than the clear and equal view one gets of a very astigmatic fundus through the correcting glasses when the compound error has been estimated. And I can, I think, mention astigmatic errors which could hardly have been corrected by test types alone. This perfect view of the fundus through the correcting glass is more important than the distant reading of test types. For if the patient be hypermetropic the correction of his latent hypermetropia precludes him from seeing well in the distance until he has worn his glasses constantly for, perhaps, some weeks or longer. No doubt with this method there is always a danger of fallacy in myopic cases, and in them it is that the test types are so valuable as an aid and as a correction; but with cases of hypermetropia the test types are almost valueless; and one can order high hypermetropia glasses with perfect confidence provided that his view of the fundus through them is quite clear, and in spite of the fact that their immediate effect is to reduce vision perhaps from $\frac{12}{12}$ to $\frac{6}{60}$. The patient, indeed, may be confidently told to return in a month or two, when he will probably be able to see $\frac{6}{60}$.

2. To make the estimation without interfering with patient's eyesight—in other words, without paralysing accommodation. This point seems to me to be most important, except in children, and any method which enables correction to be made without atropine should be chosen in order that the patient's occupation may not be interfered with. I have, myself, so seldom employed atropine* when correcting refractive anomalies that it may be said that the complete use of the direct method renders it unnecessary, except in extremely exceptional cases; for instance, in restless children or where the pupil has become extremely contracted; and, indeed, cocaine could be made to answer in both of these.

3. It will be readily acknowledged that this means of estimating refraction is the only method by which we can at the same time gain a knowledge of the fundus.

4. The estimation to be made in as short a time as possible. Occasionally in complicated cases several visits have to be made by the patient; but other methods, involving the paralysis of accommodation by atropine, occupy more of the patient's time, though perhaps very occasionally less of the oculist's. The patient's time is sometimes quite as valuable, and he always thinks it so.

To pass now to a more discursive and less tabulated consideration of the method. A good refraction ophthalmoscope is essential, and I cannot see how Couper's Magazine one can be improved upon. It has, what is so important, single, numerous, and large-sized lenses, and therefore clearness of view is not diminished by reflection from the surfaces of more than one lens. It is easily worked, and never requires the examiner to withdraw his view from the fundus to arrange its lenses. He has merely to find, while looking, which glass corrects the whole field if the error be spherical, and which two glasses correct it if regular astigmatism be the fault. By keeping the fundus constantly in view, the accommodation can after a little practice be relaxed; not so, I think, if the eye has to be every now and then withdrawn to adjust the lenses. I do not possess an ophthalmoscope with cylindrical

*Atropine is taken as the type of mydriatic; homatropine, though partially without its chief disadvantage does not paralyse accommodation so completely, and introduces, therefore, an uncertain factor.

glasses, but use instead my test glasses in the frames, after finding the correction, and I find it a pleasant confirmation to be able to see an astigmatic fundus equally through these. No doubt the reflection from the surfaces of the lenses is a trouble, but in spite of that this examination is of use; and when the optician has done his part and made the prescribed glasses, the view obtained through them is wonderfully clear and equal; in fact, as said before, a general view of the fundus can be obtained through these which it would be impossible to get by any other means, except by an arrangement such as Schoeler's, who has, according to Landolt, "added to the ophthalmoscope a mechanism whereby a series of cylindrical glasses may be successfully superposed on the spherical, each glass being so arranged that it may be rotated on its own axis."

EXAMPLES.—NOTES OF CASES.

Mrs. A., aged 27. History.—Suffers from pain in her eyes when she reads, and often at other times, and from headache. Has never worn spectacles for distance; has weak convex ones for reading. Right eye, fundus seen clearly and equally with + 8 D. Left eye, fundus seen clearly and equally with + 7 D. Without glasses, reads $\frac{5}{32}$ with either eye. With + 8 D. for either eye sees $\frac{5}{64}$ for a second and then loses it. With + 7 D. for either or both sees $\frac{5}{64}$ only. With these reads Jg. I for a second, but it comes and goes. Ordered + 7 D. for each eye for constant wear. This was on the 31st March, 1891. Two months later, she reported having had inconvenience in reading, and of course for distance, for three or four weeks after getting her spectacles. That since then her eyes had been comfortable, that her headaches had ceased, and that she could read for at least an hour and more without her eyes getting at all tired. Wears spectacles constantly, and cannot see to do anything without them now. Reads $\frac{5}{32}$ with either eye, and one letter of $\frac{5}{64}$. Fundus was clearly seen through her spectacles, a little less clearly with + 1 D. added behind my mirror. In other words, two months previously she had seen $\frac{5}{32}$ without glasses, she had seen $\frac{5}{64}$ with those ordered, and now saw $\frac{5}{32}$ and over with the same glasses. This correction had been made in a few minutes, and without atropine.

E. W., girl, aged 4 years. History of convergent strabismus for two years. Eyes converge most when she looks at anything. R. E. converges most. Strabismus is alternate. When not looking at any object the squint measures barely over 2 mm., but when looking intently at anything, whether near or far, it is quite 7 mm. R. E. can see fundus clearly and equally through + 7 D. L. E. can see fundus clearly and equally through + 7 D., rather better with + 6 D. Ordered R. E. + 7 D., L. E. + 6 D. for constant wear. This was 4th November, 1890. In April, 1891, the squint, which had been largely corrected from the first, still existed during intent vision to the extent of nearly 2 mm. Upon looking at her eyes through her spectacles it was found that the fundus of the right eye could be seen clearly with + 2 D. added, and that of the left with + 1.5 D. added. Her spectacles were therefore altered to R. E. + 9 D.; L. E. + 7.5 D. to be worn constantly.

In October of the same year no squint existed when looking at distant objects, and a hardly perceptible one for near objects. The child never showed any disinclination to wear her glasses, and acknowledged readily how much better she saw through them. No atropine had been used on any occasion, and the estimation occupied only a few minutes.

M. C., aged 4 years. Alternate strabismus. Measurement of convergence gave 5 mm. Used atropine contrary to custom to paralyse accommodation and dilate pupils. R. E., fundus seen clearly and equally with + 5 D. L. E.,

fundus seen clearly and equally with + 5 D. September, 1889, ordered + 4 D. for each for constant wear. Saw her again in June, 1890. Had worn spectacles constantly in the interval. Squint reduced to 2 mm. while wearing the glasses, but returns to 5 mm. when they are removed. The left eye, which converged most constantly, was therefore operated upon. Result complete and perfect correction of squint.

One example will be sufficient to point out the value of this method in myopia. The case I shall mention could hardly, I think, have been corrected by any other means; certainly by no other without the aid of atropine.

E. B., aged 25 years, has worn glasses specially ordered for two years. For ten years previously had worn occasionally some chosen by himself. Complaints of pain in the eyes, especially when doing near work. His glasses are as follows: R. E., — 75 D. spherical, and — 1.75 D. cyl., axis 30 degrees from the vertical. L. E., — 2 D. spherical, and — 1 D. cyl., axis 30 degrees from the vertical. Vision—without glasses R. E., $\frac{5}{6}$; L. E., $\frac{3}{8}$. With his glasses—R. E., some of $\frac{5}{6}$; L. E., $\frac{3}{8}$ —Fair, equally. Direct examination without atropine. R. E., see fundus equally and very clearly through — 1.75 cylindrical, axis as above, *i.e.*, the fundus seen well through his cylindrical glass without his spherical. L. E., see fundus well and equally through — .5 D. spherical and — 1 D. cylindrical, axis as above—*i.e.*, through his concave cylindrical glass with only — .5 and spherical instead of — 2 D. Vision with these glasses, $\frac{5}{6}$ for each. These glasses were ordered, and he was warned that he would have trouble and inconvenience for distant vision for a time at least. His sight improved very slowly, but in three months he saw $\frac{5}{6}$ with each. After other three months he saw $\frac{5}{6}$ with both eyes, and with the left alone, $\frac{5}{6}$ with the right. But with — .25 D. spherical added to the right he saw $\frac{5}{6}$. This fact induced me against my better judgment to add — .25 D., spherical to the cylindrical lens for the right eye. Had I trusted entirely to the direct examination I should not have done this, and it was wrong. A few days ago, *i.e.*, four months after that slight alteration, I found that in his left eye vision had retreated to $\frac{5}{6}$ but was $\frac{5}{6}$ in his right. As I could see his left fundus with *absolute* clearness and equality through its glass, I felt justified in concluding that by adding over — .25 spherical to the right eye I had caused an extra strain on the accommodation of his left also, and consequently increase of spasmodic myopia. I told him to have the right lens changed back to that first ordered by me, which he had been told to keep carefully. The case was evidently one of almost pure myopic astigmatism with pseudo-spherical myopia, caused probably in the first instance by spasm of the ciliary muscle in its futile effort to overcome the astigmatic error, and increased no doubt, and at any rate kept up, by his two years' unnecessary wear of concave spherical lenses of — 75 D. and — 1.5 D. for the right and left eyes respectively. The interesting points about the case are, the very slow relaxation of this spasmodic myopia, and its absolute relaxation from the first when the eyes were under examination by the direct method. I believe that he will in a few months time see $\frac{5}{6}$ with his left eye, but think it not improbable that I may then have to remove its spherical — .5 before the right can see $\frac{5}{6}$, as my last examination led me to think that the left eye also requires its cylindrical glass only, and is still over corrected with its — .5 spherical added to that.

E. P., aged 20 years. History.—Had blight six years ago. Since then eyes have troubled. "Can see better if he screws them up." Cannot see distant objects, and has to hold book very near to read, had to do so at school.

Pain and lachrymation in left eye if he reads at night. Examination.—Lids healthy, eyes water very easily and have somewhat bleared look in consequence, especially the left. This case had come from a distant town. He wished to become a solicitor, and eyesight to him was therefore of great importance. His time in Brisbane was limited. Atropine, therefore, was to be avoided if possible. Vision was—R. E., $\frac{6}{12}$ and Jg. i; L. E., no letters at 18 feet, and Jg. i. only at 2 inches from his eye. His right eye gave me no great difficulty. Its fundus could be best seen with +1.75 D. cyl. axis horizontal, but pretty well with +1 D. spherical added to this. His left eye puzzled me much at first, and it was not until his third visit that I found its correction. Finding that the horizontal vessels could be best seen with +3 D., while the vertical vessels could not be seen until I had —3 D. behind the aperture in my mirror, and they were best seen with —3.5 D. With R. E., +1.75 D. cyl. axis horizontal, and L. E., +3 D. spherical and —6 D. cyl. axis vertical he saw $\frac{6}{12}$ and fan equally with both and either. And through those for the left eye, I obtained for the first time a clear and equal view of its fundus. The astigmatism being so high, none of the vessels could be perfectly clearly seen until it was corrected. He was ordered these: R. E., +1.75 D., cyl. axis horizontal, L. E., +3 D. spherical —6 D. cyl. axis vertical, for constant wear. After two days of constant wear he reported that his eyes had been quite comfortable, that there had been no lachrymation or “screwing up” of his eyes, and that he had read also without discomfort. Reads $\frac{6}{8}$ with R. E., and some of $\frac{6}{8}$ with left. Reads Jg. i. with left eye and glass at 10 inches, and chooses 8 inches: very comfortably with both eyes, and best at about 14 inches, and also better with both eyes than with one alone. Subsequent news was satisfactory.

S. M., boy, aged 10 years. Suffering from convergent strabismus of a low degree, and from asthenopia. October, 1888.—R. E., sees $\frac{6}{18}$; L. E., $\frac{6}{60}$. Examination without atropine. R. E., horizontal vessels seen well with +1 D., vertical with +2.5 D. L. E., horizontal vessels seen well with +1.5 D., vertical with +5.5 D. Ordered for constant wear—R. E., +1 D., spherical and +1 D. cyl. axis vertical. L. E., +1.5 D. spherical, and +4. D. cyl. axis vertical, with these could read with R. E., $\frac{6}{8}$ and Jg. i. comfortably. With left eye, the squinting one, read $\frac{6}{18}$ and Jg. 10. In August of the following year, my last note about him gives: R. E., $\frac{6}{8}$; L. E., some of $\frac{6}{8}$, and Jg. i. at 10 inches. Squint practically gone. Uses binocular vision for distance, and I think also for reading. This boy I estimated also under atropine with the same result, except a doubtful extra dioptré of spherical hypermetropia.

E. W. B., aged 18 years. Bank clerk. History.—Has had a slight squint in left eye from childhood. Noticed a few months ago that sight in it was defective. Examination.—Tendency to rotatory nystagmus in both eyes. Left eye slight divergent strabismus. Vision, R. E., $\frac{6}{8}$, L. E., part of $\frac{6}{8}$ and Jg. 16. Without atropine and as result of examination by ophthalmoscope aided in the ease of the right by test types, I ordered him—R. E., +.5 D. cyl. axis vertical; L. E., +2 D. cyl. axis vertical. With the glass for right eye he saw $\frac{6}{8}$, with that for left eye sight was unimproved; still I could see his fundus clearly and equally through it, and therefore ordered the above for constant wear, telling him to cover the right eye for a period of each day and practise using the left eye for both near and distant work. This was in March, 1891. In April, the left eye saw $\frac{6}{8}$ and Jg. 4, if held at 4 inches. Eyes converging better. In June, read some of $\frac{6}{8}$, and Jg. i. at 3 inches. In September, read $\frac{6}{8}$ and Jg. i. at 4 inches, and Jg. 6 at 8 inches. His sight has not improved further, but the squint and nystagmus have disappeared, and he can see better for both

near and distant work with both eyes than with the right eye alone, and finds the glasses a great help. I ascribe the lack of further improvement to irregular astigmatism.

I could multiply records of cases, as those of all my patients have been kept; but the above cases are sufficient to illustrate what I wish. One case which seemed to me both unusual and satisfactory, except that I do not know her subsequent history, is as follows:—

Mrs. F., aged 35. History—Has always been troubled with her eyes, with the left more than with the right. Sees R. E., part of $\frac{2}{1}$; L. E., $\frac{6}{10}$. As result of ophthalmoscopic examination aided by test types without atropine, and after one visit, ordered her R.E. + 5.5 D. spherical and—2.5 D. cyl. axis obliquely horizontal. L.E., + 8 D. spherical and—4.5 D. cyl. axis horizontal. With these she saw $\frac{6}{18}$ with either eye and saw clearly and equally; and read Jg. i. at 8 inches. I could see the fundus with perfect distinctness and equally through them, especially through that with the left eye, and am confident that if she continued to wear them constantly her sight will have improved to 6 or even further. She lives at a great distance from Brisbane, and I have had no news of her since March of this year, when I ordered the glasses. She experienced comfort even during her first few days of wearing them.

The only refraction cases about which on looking through my note-books I see cause for regret, are those where instead of relying chiefly upon ophthalmoscopic examination in hypermetropic cases, I have erred upon the side of securing good vision as the immediate effect of spectacles, and have therefore corrected only a small amount of the latent hypermetropia. All the hypermetropia that becomes manifest when the eye is under direct examination may be safely corrected, and in my experience nearly all becomes manifest.

A Case of Atrophy of the Optic Nerves, with dropping of watery fluid from the Left Nostril.

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H.B., male, aged 20, consulted me at the out-patient eye department of the Wellington Hospital, on 8th April, 1890, on account of blindness and a continual dropping of a clear watery fluid from his left nostril. The history of the trouble dated back three years. The illness began with severe headaches and gradual failure of sight, together with attacks in which the patient used to fall down in a sort of fainting fit. No definite account of the fits could be obtained, but there were apparently no convulsions. Dr. Henry examined the eyes at an early stage of the trouble, and tells me that there was well marked optic neuritis in both, and that he, at the time, suspected an intra-cranial new growth. The sight continued to get worse, and at the end of a year a watery discharge began to drop from the patient's left nostril. Coincident with this, the fits ceased, and there had not been any since. There were no nasal polypi, and no diseased condition could be detected in the nose or nasopharynx; nor was there any evidence of a diseased condition of the accessory cavities. On examination, the condition noted was as follows:—The patient was a well-nourished, healthy-looking, intelligent lad, with head erect and eyes wide open. The pupils were partly dilated, equal, and slightly sensitive to light. V=p.l. with both eyes. There was atrophy in both optic discs, the margins being sharply defined. There were no retinal hæmorrhages. A clear, watery fluid dropped continuously from the left nostril at the rate of about one ounce in an hour. On examination, the fluid was found to be clear and transparent; S.G. about 1,006. On boiling with acetic acid, there was a slight cloudiness. There was a considerable proportion of chlorides and a trace of sulphates present; and the salts were principally those of potassium. In three different specimens examined there was no reaction of sugar in any. I have collected seven cases of a similar condition, and there have been several others reported with a continuous dropping of watery fluid from the nose, but without atrophy of the optic nerves. Of these seven cases six were evidently much the same as my own; the seventh—that reported by Dr. John Berg in the *London Medical Record* for 1889—was, to some extent, different. The probable cause, and seat of origin of the fluid, and the manner of its finding its way into the nose have been explained differently by different observers. As very few of the cases have been examined after death, these points are still obscure, and reports of similar cases may be of value in helping to explain the condition from the clinical point of view. Nettleship made no attempt to explain his case. Priestley Smith, in reporting his cases, suggested that there might have been polypoid growths encroaching upon the sphenoid or ethmoid cells, with destruction of the bone and inflammation of the meninges. This theory was founded upon a case reported by Sir James Paget, and on one of his own, in which there was a polypus of one nostril. Paget's case does not appear to have been one of the disease under discussion, for there was no optic atrophy; the dropping ceased during local treatment, and the patient died of meningitis, occurring after exposure to fatigue and cold.

In Priestley Smith's case, as soon as one nostril was blocked by the polypus the fluid began dropping from the other; showing, I think, that the polypus rather tended to stop the discharge than to cause it. In discussing Emrys Jones' case, some years later, Priestley Smith stated that there was very strong reason for supposing the fluid to be cerebro-spinal. Leber expressed the opinion that the fluid was cerebro-spinal, and argued that "a secretion so watery and abundant is in all probability the product of a vascular organ specially adapted for secreting, such as the choroid plexus of the ventricles." He compared the secretion to that of the ciliary processes of the eye and the glomeruli of the kidney, and suggested that there may have been a defect in the bones at the base of the skull, the membrane covering which yielded after a time to continued pressure. Berg, guided by the experiments of Key and Retzius, considered it probable that the discharge was owing to an exudation or rupture of the enlarged lymph channels between the sub-arachnoid space and the nasal mucous membrane.

I am of opinion that in the first six cases which I have tabulated, and in the one which I report, the fluid was derived from the sub-arachnoid space, and that probably it found its way into the nostril through a natural communication between that space and the nose; and that it was derived, as suggested by Leber, from the same source as hydrocephalic fluid. I look upon the early symptoms and condition as being analogous to an attack of glaucoma, and the relief caused by the escape of fluid through the nose may be compared to the relief of the increased tension in the eye by the escape of fluid through the canal of Schlemm.

In "Sajou's Annual of the Universal Medical Sciences for 1891," there is an account of some experiments by C. S. Flatau on the subject of the communication of the nasal lymph passages with the sub-arachnoid space. He quotes a case of chronic hydrocephalus which got well after an abundant serous discharge from the nose, thus showing that fluid may pass from the cranial cavity through the nose. He states that Naumyn and Schreiber were able to inject warm salt solution into the sub-arachnoid space of a dog and make it come out at the nose, the phenomenon being accompanied by protrusion of the eye and chemosis. This might explain the exophthalmos in some of the cases under discussion. Schwalbe, Key, and Retzius demonstrated the existence of this communication. Flatau made some experiments of his own, and found that, though fluid passed from the sub-arachnoid space into the nose, the injection of coloured fluid from the nose did not lead to the entrance of the fluid into the sub-arachnoid space. This shows that the communication must be very small, and probably explains the fact that a considerable amount of increased intracranial tension was required before the fluid escaped in the cases under consideration.

As evidence that the fluid came from the cranial cavity, there are the following facts:—

1. The fluid closely resembles cerebro-spinal fluid in its chemical composition. The absence of the substance which reduces Fehling's solution in most of the cases is not opposed to this statement, for Hoppe-Seyler states that it only occurs as a result of irritation or inflammation of the brain or spinal cord.
2. In two of the cases there was exophthalmos.
3. In all the cases except one, besides optic atrophy, there were grave cerebral symptoms indicating increased intracranial pressure.
4. The brain symptoms came on before the dropping from the nose, and were relieved by the escape of the fluid.

TABLE giving a short account of similar cases published. (*Dr. Mackenzie's paper on Atrophy of Optic Nerves.*)

Case and Surgeon reporting.	Age	Duration.	Cerebral Symptoms.	Eye Symptoms.	General.	Nose and Accessory Cavities.	History.	Progress and Result.	Character of Fluid.	Diagnoses.
Girl (Nettleship), Oph. Rev., 1883.	23	2 years..	"Loss of senses" and memory for words, headache, weakness of the left side of the body.	Some exophthalmos, post papillary atrophy of optic discs.	Palpitation and hysterical attacks, some loss of taste and smell.	Running of clear watery fluid from left nostril which is swollen and excoeriated.	Several attacks of inflammation of the lungs.	No treatment efficacious; slight general improvement.	Colourless, slightlyropy. Opalescent, neutral; chlorides in abundance, trace of phosphates and sulphates, no reaction of sugar	
Woman (Baxter).	6	"	Twiteling of muscles on left side of trunk.	Double neuritis her iopia.	Hysteria, enlargement of thyroid.	Persistent flow of watery fluid from right nostril.	.....	Died with cerebral symptoms in three years, P.M. No coarse brain lesion.		
Man (Priestley Smith), Oph. Rev., 1883.	23	6	Headache, vomiting, excessive sleepiness when dropping ceased for a time; later, convulsive attacks.	Atrophy of optic discs, horizontal nystagnus	.....	Dropping of watery fluid from right nostril.	Onset while recovering from small-pox.	Promide diminished the tendency to drowsiness. Died in convulsions.	Clear, colourless, S.G. 1.007, abundance of chlorides. It contained alkali albumen, and mucin. No sugar reaction.	Doubtful, possibly encroachment of growth on sphenoïd or ethmoid cells.
Man (Priestley Smith), Oph. Rev., 1883.	22	6	Severe headaches, unconsciousness, delirium, vomiting fits.	Turning inwards of both eyes fit, during double atrophy, exophthalmos.	Bulging of the forehead, paralysis of the lower extremities.	Polypus in right nostril. Dropping of watery fluid first from right and after polypus grew, from left nostril.	Six years before the reporting he had severe brain symptoms.	Almost continuous dropping of watery fluid from the nose; when it stopped severe brain symptoms occurred.	Almost same as above, S.G. 1.008. Reaction of sugar.	As above.

TABLE giving a short account of similar cases published—*continued*.

Case and Surgeon reporting.	Age	Duration.	Cerebral Symptoms.	Eye Symptoms.	General.	Nose and Accessory Cavities.	History.	Progress and Result.	Character of Fluid.	Diagnoses.
Man (Enry's Jones), Oph. Rev.	65	12 years. Eye symptoms 3 years.	.....	Atrophy of both discs. In R.E. V = 4, central field much contracted. L.E. V = fingers.	"Chronic influenza for twelve years.	Discharge from both nostrils, especially the left.	.....	.....	Alkaline, S.G. 1.035, cloudy on boiling with acetic acid and boiling there was a flocculent deposit, abundance of chlorides, trace of sulphates.	
Girl (Leber), Oph. Rev., 1883.	13½	5 years..	Giddiness, headache, "epileptic fits."	Failure of vision, atrophy of optic nerves. V = fingers.	Catarrh, enlarged tonsil, coryza, indurated cervical glands, carious teeth.	Dropping of watery fluid from nose for fourteen months. Loss of smell.	Hydrocephalus from birth, weakly, and undersized, large head, vision and intelligence good in childhood.	.....	Clear, S.G. 1.007 to 1.005, trace of albumen, chlorides, and sulphates present, fatty acid in combination with an alkali, reaction of sugar.	Cerebro spinal fluid coming through a fistula due to excessive intra-cranial pressure.
Woman (Dr. John Berg), Lond. Med. Rec., 1880.	25	10 " ..	Violent headache for a year.	Sensation of weight behind eyes, moderate exophthalmos, bilateral atrophy of optic nerves. V = pl.		At intervals an abundant flow of clear yellowish fluid from the nose. Diminished smell.	Pain in head less while the discharge lasted.	Removal of right eye with trephining the cavity of the sphenoid by piercing the inner wall of the orbit; later on dilatation of the opening. Permanent return to health. Sight did not return.		Hydrops of cavity of sphenoid bone.

A New Operation for Pterygium.

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I AM doubtful as to the propriety of the title of this short communication, because the principle of the operation I am about to describe is similar to the usual procedure for the transplantation of pterygia. The novelty, I believe, to exist is only in a detail. Some practitioners make short work of pterygia, removing them altogether. With this proceeding I have no acquaintance, as, believing the teaching I received, I have always dreaded a recurrence of the growth. In dealing with this affection of the eye then, my practice has been limited to the method known as transplantation; growths of moderate size I dissected back to their base, and transplanted downwards into a slit in the conjunctiva. Pterygia of a large size I divided in the middle, transplanting the upper section upwards, and the lower downwards. But with this proceeding I was rarely satisfied, not that I ever saw a recurrence of the growth, but because, do it as neatly as I could, there always remained an unsightly thickening of the tissues about the plica semilunaris. To obtain a better cosmetic effect without incurring any risk of recurrence, seemed very desirable, and it occurred to me that the lower half of every pterygium might be removed without risk of onward growth if the upper section were turned down and made to adhere to the base from which the lower half was excised. This I have done for two or three years, and have seen no case of recurrence, while the size of the resulting fleshy excrescence has diminished, much to the advantage of the patient's personal appearance. Briefly, then, I proceed in the usual manner until the pterygium is dissected back; I remove it as cleanly as possible from the sclerotic, leaving no sub-conjunctival tissue; I then split it horizontally and remove the lower section; the upper section is then stitched downwards with one suture, so that the inferior edge of it is in contact with the base from which the lower section was removed, and to which it ultimately adheres, effectually arresting any further growth.

“Dot Cataract.”

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As the subject of dot cataract has recently been brought before the Ophthalmological Society of the United Kingdom, and as there are not many cases recorded, I am about to give the Section the particulars of four (4) cases of this rather rare condition, which have come under my own observation.

Dr. Wray (Croydon) read a paper before the above-mentioned society in January of this year, and in it he classified the varieties he had found to exist. I shall not attempt to follow this classification, but will record my cases in order, and mention the peculiarities of each.

CASE No. 1.

E. W., female, aged 17. Eyes have been troubling her for some months past; headaches and accommodative asthenopia complained of. On examination: The anterior part of the right lens was found covered with fine punctate, and apparently superficial opacities, they were arranged without any reference to the anatomical structure of the lens, and equally distributed all over the surface. The chart (*exhibited*) shows the condition as seen on 13th June, 1891. Vision (under homatropine), R. = $\bar{c} + 1.5$ D. $\frac{5}{8}$ (nearly) L. = $\bar{c} + 1.25$ D. $\frac{5}{8}$. On August 27th, 1892: Eye examined again, and only a very few of the spots could be found (*vide* Chart No. 1). The spots to be seen are now not only very much reduced in number, but also in size and distinctness, so that it is necessary to use a plane mirror with dull light to see them well. Her vision in this eye has improved, and is almost as good as the left or $\frac{5}{8}$ nearly.

CASE No. 2.

C. S., male, aged 22. Vision has never been quite good in either eye; can see a black spot before the right, which dazzles his sight in the sun, and can see crescents round the moon; has never had any inflammation or disease of any kind in the eyes. Right.—Three (3) opacities seen of the lens (*vide* Chart No. 2), one at the lower part of the periphery, which seems to extend backwards through the whole thickness of the lens, and by a radial streak downwards to the extreme circumference; the other two spots are towards the upper part, and are of a whitish colour and of a circular shape; there are three (3) slight thicknesses on the pupillary margin of the iris at its upper part, but the pupil dilates thoroughly and evenly with homatropine. Left.—There are five (5) spots on this lens situated nearer the periphery than the centre, and of similar shape and colour to the smaller ones in the right eye; one thickness on upper part of this pupil. Also (*vide* Chart No. 2.) Vision, R. = $\bar{c} + 1.75$ $\frac{5}{8}$ (nearly) L. = $\bar{c} - 0.75$ D. $\subset + 1$ D. cyl., axis 120 $\frac{5}{8}$ nearly.

CASE No. 3. (August 28th, 1891.)

W. G., aged 38 years. Vision of right eye not comfortable; can often see two objects when eye used for distance, and things looked blurred for near vision, but by an effort he can make them more distinct; has had some

supraorbital pain lately. A small round spot found at lower part of lens to the outer side, the rest of the lens is clear. Two (2) white spots below and to the outer part of the macula. (*Vide* Chart No. 3 exhibited.) Vision, $R=\frac{6}{8} \bar{c}-0.50$ D. $\frac{6}{8}$.

R. Field; somewhat contracted all round, August 23rd, 1892. Right eye examined again, and another small spot found close to the original one, this spot is very small and thin, and may possibly have been overlooked on the previous occasion. Vision keeps the same.

CASE NO. 4.

H. D., aged 16. Eyes not comfortable for more than two years past. Right: Four (4) spots seen on the lens, one much larger and thicker than the others and nearer to centre; and the other three (3) are circular, whitish in colour and near the periphery. Vision, $R=\bar{c}-3.5$ D. $\bigcirc-1.5$ D. cyl. axis. hor. $\frac{6}{8}$ L= $\bar{c}-5$ D. $\frac{6}{8}$.

I have notes of one other case in which there are numerous streaks of opacities in both lenses, and in which there is retinitis pigmentosa, but as the individual is 39 years of age I cannot be sure, without further observation, that the case is not one only of ordinary cataract.

It will be noticed that three (3) out of the four (4) cases recorded are in young adults, the period of life in which dot cataract is most easily recognised, and least likely to be mistaken for developing senile cataract. In all the cases there was some ametropia present, the correction of which, however, raised the acuity of vision in nearly the whole of these to the normal standard. The more generally peripheral position of spots would account for this success in correcting the visual defects, and the possibility of gaining good vision shows that in this form of cataract there cannot be much, if any structural change in the lens outside the spots themselves to interfere with its refracting power, resiliency, &c. Case No. 1 is one of most unusual interest, and to me one of fresh experience; that a lens should clear up to this extent in a little more than a year is remarkable, and I must confess it was a most unlooked-for result.

No. 2.



Name... *J. C.* Age... *22*.....

Disease... *Not Cataract*.....

R $\bar{E} + 1.75 D \frac{6}{8} ?$
(from H. cataract.)

Vision

L $\bar{E} + 75 c + 1 D \text{ or } 120 \frac{6}{8} ?$
(from H. cataract.)

Date... *Jan. 8, 1892*.....

No. 1.



Name... *F. W.* Age... *19*.....

Disease... *Not Senile but Dot Cataract*

R $\frac{6}{12} \bar{E} + 1.5 \frac{6}{8} ?$
(from H. cataract.)

Vision

L $\frac{6}{8}$ (nearby) $1 c + 1.25 \frac{6}{8}$
(from H. cataract.)

Date... *June 13, 1891*.....

Vision (Aug. 27, 1892)

$\bar{R} \frac{6}{12} c + 1 D \frac{6}{8}$ (nearby) 1

Tumor of the Optic Nerve (with case).

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Hon. Physician, Throat Dept., Adelaide Hospital.

As tumors of the optic nerve are not of very frequent occurrence, and as there are not very many cases recorded, I have thought it worth while bringing this case before the Section. On July 2nd, of this year, a child aged 15 months was brought to me with the following history:—When six weeks old the right eye was first noticed to protrude more than the other, and since then it has been getting gradually larger, until the lids can now no longer cover the globe.

The child never seems to have suffered any pain from the first. Present condition (July 2nd): Extreme proptosis, the protrusion being almost straight forward, slightly outwards, and mobility very deficient, but its centre of rotation not altered, cornea quite opaque and staphylomatous, vessels of the lids enlarged, apparently no pain or tenderness of the globe; vomiting has come on during the past few weeks, which may be connected with the cutting of the molar teeth. Operation: The eyeball was removed the same day, and presented the appearance as now exhibited in the specimen submitted, viz.: A large mass behind the eyeball, through which the optic nerve is seen passing; the tumor is encapsuled and therefore came away quite easily, there being no adhesion to the orbit, nor did there seem to be any secondary infiltrations, as the orbit on its removal was quite empty. The globe is enlarged anteriorly, its interior completely disorganised and filled up with a broken down mass of soft material. The microscopic section (*exhibited*) shows that the tumor is one of the optic nerve proper; the elements of which are replaced by small sarcomatous-like cells, and these are seen to extend forwards into the posterior chamber of the eyeball. The child seemed to improve for a time after the operation, but papillitis on the other side has since appeared with complete loss of vision, making the prognosis very grave.

Tumors of the optic nerve have not occupied up to the present a very prominent place in ophthalmological literature, only about forty (40) cases are on record.* Those which grow from the stem of the nerve, including the pial sheath and its trabeculae—the *essential* variety of *Leber* are the most frequent, and are always some form of *sarcoma*. They mostly occur in early life, and are possibly sometimes, as this case seems to have been, congenital. The symptoms which *Von Graefe* held to be most characteristic of tumor of the optic nerve were present in this case in a marked degree, viz.:—Increasing protrusion of the eyeball forwards and outwards, with retention of its motion and without displacement of its centre of rotation, and absence of pain. When these symptoms are all present the diagnosis can be made with tolerable certainty, and operative interference can be resorted to early.

* For list of references *vide* Noyes' diseases of the eye. Second edition, p. 607.

Paralysis of Third Nerve from Myxoma of the Nostril.

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Hon Physician, Throat Department, Adelaide Hospital.

History.—Mrs. C., aged 47. For ten years past has felt left nostril obstructed, and has had frequent feeling of stupidity accompanied by headaches and loss of memory. Two months ago got influenza, she then began to have pain in the left eye, which extended upwards as far as the parietal eminence and some deafness on the same side. This pain gradually increased, and in three weeks became so intense that she was nearly frantic with it, and could not get any rest or sleep. The left upper eyelid now began to droop, diplopia and loss of accommodative power came on and finally complete ptosis. The pain continued unabated and vomiting set in, which also continued up to the time she came under my treatment.

Present condition (June 19th, 1890).—Seems to be in great agony and scarcely able to answer questions. On examination of the nose, the left nostril was found filled up with a polypus, and a quantity of offensive pus oozing out around it; she has only one tooth (canine) left in the upper jaw on this side.

Eye.—Complete ptosis, divergent strabismus, and widely dilated pupil.

Operation (June 21st).—Polypus removed *en masse*. The nasal cavities were then exposed by Rouge's method and explored. On the left side the cavity of the antrum was found to have opened into the nostril, the dividing wall, with the inferior turbiated body, having quite disappeared; the antrum contained pus and its lining membrane was greasy and thickened; careful examination of the cavity failed to discover any opening into the orbit. Thorough washing out with solution of sublimate completed the operation. The patient made a rapid convalescence, and all pain, &c., gradually disappeared. At the end of the first month after the operation the paralysis of the eye was pretty much the same; she was then put on 3 i doses of liq., hydrarg., perchlor., thrice daily. At the end of the second month the ptosis began to disappear, the pupil became reduced to 6 m.m., and slight movements of all the muscles involved returned. About a month after this she had some return of the headache, which was found to be due to a regrowth of the polypus in the same position, this was removed with a snare and the symptoms disappeared. Another small regrowth about a month subsequently was similarly dealt with, and the application of the galvano-cautery prevented any further recurrence.

August 23rd, 1892.—The eye appearances are pretty much the same as when last note made. No ptosis; movements inwards, upwards, and downwards still very imperfect, especially upwards, possibly the more restricted movement upwards is due to the superior oblique having partly recovered its power of rotating the eyeball downwards now that there is some restoration of adducting power, cross diplopia, prisms 14° base inwards and 10° base downwards, fuse the images (Maddox test); pupil not altered in size. Vision—R= $\bar{c}$ + 0.50 D $\frac{2}{3}$. L= $\bar{c}$ + 1 D. eyl. axis 75° $\frac{2}{3}$ (nearly). The growth (*exhibited*) is of large size, and a microscopic section (*exhibited*) proves it to be an ordinary Myxoma, undergoing cystic metamorphosis—a change which is not infrequent in nasal polypi. The section shows a well-developed

cyst containing mucin in its interior and the general arrangement of the growth, including the stellate myxomatous cells, is characteristic. The interest of this case centres in the distinct connection between the paralytic lesion in the eye and the growth in the nose. The patient evidently had the polypus for a very long time in the nostril previous to the influenzic attack, probably then something occurred, which, by increasing its size, caused obstruction to the opening into the maxillary antrum, and this orifice being occluded, the normal secretion accumulated to such an extent that a purulent inflammation of the cavity resulted—a natural result, for wherever we have inflammation of the mucous membrane lining a closed cavity suppuration necessarily ensues. This suppurative process, along with the pressure of the growth on the wall separating the antrum from the nostril, caused its obstruction and ultimate absorption. By-and-bye the sphenoidal antrum also probably began to participate in the pathological changes going on in the nostril, either its cavity being closed becomes the seat of suppuration, or possibly pus is pressed into it from the nostril below, and acute inflammation of the mucous membrane follows. This latter occurrence would serve to explain how it was that one of the cranial nerves became involved, but it still seems strange and hard to account for, that the third nerve only of all the nerves passing through the sphenoidal fissure should be attacked. The position of the third in relation to the other cranial nerves in the fissure might have something to do with it, inasmuch as part of the third nerve occupies the lowest place in the fissure, except the sixth, which, however, is on a plane external to the third, and it is worthy of note that the only portion of the nerve which has now completely recovered is that which comes from the most superior branch, viz.: the branch supplying the levator muscle. The very severe pain in the head was probably due to the inflammation of the sphenoidal antrum, cerebral pain being one of the recognised subjective symptoms of this condition, and its rapid disappearance after the removal of the growth confirms this idea, for had the pain been due to meningeal inflammation, caused by suppuration in the adjoining cavity, further trouble would most probably, in spite of all interference, have followed. Bull (New York) has lately published a most interesting paper on “Tumors of the Orbit secondary or consecutive to Tumors of the neighbouring Bony Cavities,” which throws much light on this case,* and Priestley Smith records a case of erosion of the sphenoid by a myxomatous growth, and pressure on the optic foramen resulting therefrom. The connection between the eye and the nose, and its accessory cavities, is a subject of very great and practical interest to the ophthalmologist and rhinologist alike. At the last meeting of our Congress I recorded a number of cases in which this connection was clearly established; amongst the rest a case of empyema of the antrum, in which there were various ocular symptoms e.g., diminution of the field of vision, retinal hyperæsthesia, &c., all of which disappeared when the antrum disease was cured.† Ziem has recorded similar cases.‡ Schech records a case of protrusion of the eyeball, with atrophy of the optic nerve, in connection with disease of the antrum,§ and Maier has reported a case in which the antrum disease spread to the ethmoidal sinus, the orbit, and finally to the brain, and caused death from meningitis.||

* N. Y. Med. Jour. Vol. Lxiv. No. 25.

† Trans. Second Intercolonial Med. Congress.

‡ Berlin, Klin. Wochenschr. 1888, No. 37.

§ Diseases of the mouth and nose, p. 277.

|| Edin. Med. Jour. May, 1886.

Congenital Defects

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I. CASE OF DOUBLE ANOPHTHALMOS WITH CONGENITAL CYST IN THE RIGHT LOWER EYELID.

For the opportunity of showing this very rare anomaly, I am indebted to my friend Dr. Crago. The child was born on May 29th, of this year. The mother was 15 years of age, and unmarried; and the father was 16. They were not related to one another. I first saw the child two days after its birth; it was small, healthy, and well nourished. Examination showed the orbits were well developed; the eyelids sunken, the palpebral fissures normal; the sockets well formed and lined with conjunctiva; and the eyes apparently absent. In the right lower eyelid, and extending back into the orbit under the conjunctiva, was a bluish cyst about the size of a marble. There was no cyst in the left lower eyelid. About three months later the child had an attack of acute cellulitis of the left orbit. The cyst in the right lower lid had increased to the size of a walnut, and gave the skin over the cyst a tense bluish appearance. Under an anæsthetic I made an incision through the left lower eyelid into the orbit, which gave exit to a quantity of pus; I also opened the cyst in the right lower eyelid, and about a drachm of thin greenish-yellow fluid escaped. Dr. Crago and I then carefully examined the sockets, but failed to discover any trace of an eye. Subsequently, the cyst suppurated and was reopened.

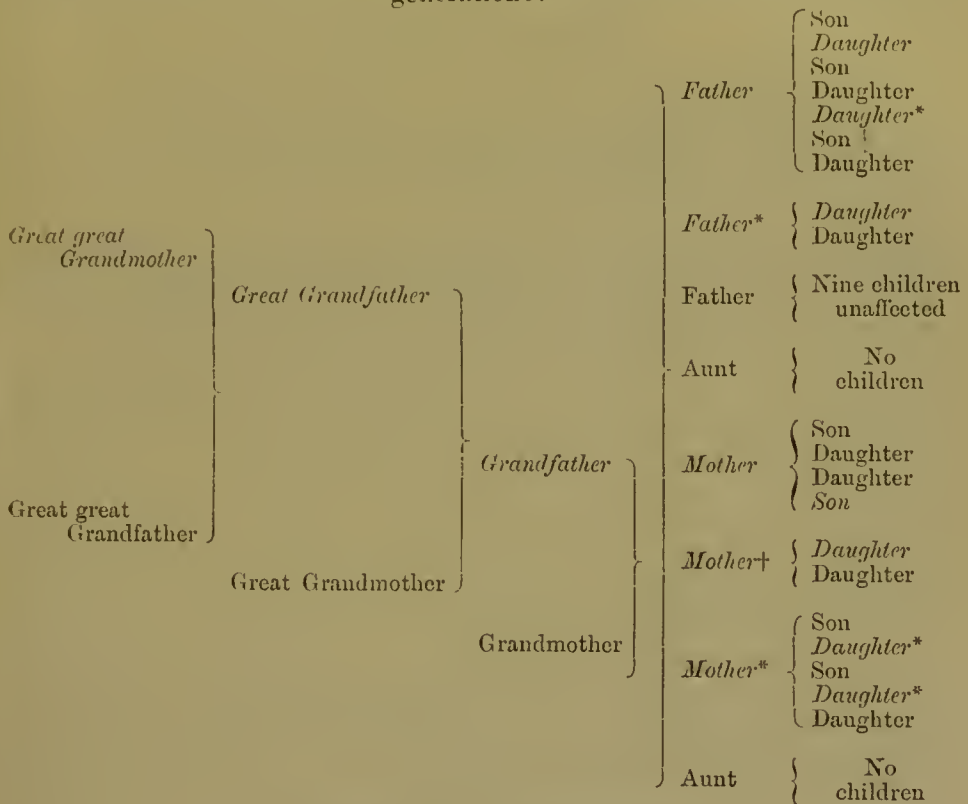
II. CASES OF IRIDEREMIA.

As the cases to which I am about to refer show the hereditary tendency to congenital anomalies of the irides, I consider them of sufficient interest to bring before the members of Congress. The first of these cases which came under my notice was Mrs. F. She stated that her sight had always been defective, but of late it had become rapidly worse. Both eyes were small; the corneæ flat and ill-developed; both lenses partially opaque, and lying against the posterior surfaces of the corneæ, and the irides were absent. I subsequently extracted the cataracts. The family history was of much interest. It showed this congenital defect extending through five consecutive generations. Mrs. F.'s father had the same kind of eyes as herself, and he frequently remarked that his father and grandmother were similarly affected. He had eight children, and twenty-nine grandchildren; of the former four—two sons and two daughters—had irideremia, and one daughter coloboma of the irides, and of the latter seven—one grandson, and six granddaughters—had irideremia.

I have drawn up a table showing the members of the five generations who were known to have this congenital anomaly. It was impossible to get particulars of more than one member of the first, second, and third generations. I have examined the eyes of seven of these cases; one had coloboma of the irides outwards and slightly downwards, and six irideremia complete or nearly so. All Mrs. F.'s brothers and sisters married. It should be noted that her

brother, whose eyes were unaffected, had nine children with normal irides; and her two sisters, whose eyes were unaffected, had no issue; while her two brothers and her two sisters, whose eyes were affected, and Mrs. F., all had children with this defect. Further, the sister with coloboma of the irides, had two daughters, one with irideremia, the other unaffected. Another point of interest is the preponderance of females in the last generation with irideremia.

TABLE showing cases of Irideremia extending through five consecutive generations:—



N.B.—Cases of irideremia are printed in *italics*.

* Cases shown.

† Coloboma.

SECTION OF MIDWIFERY.

President's Address.

By W. BALLS-HEADLEY, M.A., M.D., Cantab., F.R.C.P., Lond.

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Physician to the Women's Hospital, Melbourne.

Gentlemen,—For the high position in which you have done me the honor to place me, I beg to thank you. It appears to me that I cannot address you on a subject more generally valuable and interesting than that of the evolution of disease in woman, and the influence exerted by civilisation.

The object of woman's development is the propagation of the race, but the advantage of the degree of such propagation is dependent on the environment. If the extremes of such surroundings be taken, the Mormons may be instanced on the one hand, the Cingalese on the other. The Mormons, on inhabiting the neighbourhood of Salt Lake, were in the midst of an enormous, desolate, and uncultivated territory. Population and labour of the cheapest kind were desired, and were supplied by polygamy. The extravaganees of civilisation were avoided, whence accrued the cultivation of the soil, food, and wealth. The antithesis exists in Ceylon, where the population has reached its limit of food supply from the rice-fields. There the sons of a family collectively marry one woman, most of whose female children are destroyed, so that the number of families is not increased. The requirements of our civilisation render the propagation of many children undesirable; and, by their own inherent qualities, entail conditions which evolve such disease in woman as limits the population. A first factor to this end is that, as the number of men who live to be adults is usually less than that of women, and as many men do not marry, many women never marry, while many do not marry until long after their due development. Prevention of pregnancy, as well as the production of abortion, also largely exists in civilisation; by all which conditions the population is limited.

With regard to the mode of causation of the diseases of women, it seems to me that it has to be granted either that a number of morbid actions and results, tending to prolonged misery or death, have been showered upon them; or that, being originally well and healthily made, and capable of effecting the needful ends, the circumstances and the manner of their existence are such as to place them in the way of a breaking down of their machinery, and that some part having so failed, its lapse from the normal so influences for evil other parts as to be liable to cause a general disorganisation and failure, and that thus their manifold affections may be studied as a gradual progress or evolution of disease, tending in their results to effect the end the abnormal conditions necessitate; or, in other words, that civilisation requires the limitation of the propagation of the race, and as polyandry

and the destruction of children are contrary to the tenets of civilization, the end is to be effected by disease in women, rendering them incapable of continuing to bear children, as they would if they remained healthy. The conditions of advanced development effect the necessities of advanced civilisation—a limited population.

The general results of civilization exhibit themselves in the woman and in the child. In the woman, one of three types may occur. There may be:—

First, an excess of development of mind, and the diminution of animalism. The former may be exhibited in—

- (a) High intellectuality.
- (b) Congenital and educational tendency to luxurious and expensive living and dress. And
- (c) Much delicacy of feeling, with a moderate or low degree of intellectuality, but in each case with a deficiency of development of sexual feeling and, by inference, of the sexual organs; though not of the breasts and excellence of female form. In such types may be found congenital deficiency of development in size of the mouth of the womb, and in direction of the canal, a foetal ante-flexion maintaining at and after puberty. Hence will arise difficulties in the escape of the uterine discharges, in the entrance of the sperm, and of dilation in the birth of the child.

The second, and normal type, is a due proportion of development of mind and animalism. Should, however, the conditions of civilization interfere with seasonable marriage, uterine congestions and inflammations, or myomatous growths, are likely to occur.

The third type is the excess of animalism over mind, which is equivalent to a deficiency of development of the restraint of civilization over animalism, examples of which are found in the alcoholic and polyandrous from choice; hence arise undue sexual excitement, miscarriages (congestive or induced), and inflammatory diseases.

Of these types, the second is the normal with regard to the propagation of the race, and of woman's being; but the frequent non-occurrence of seasonable marriage in civilization is liable to render its members unhealthy, and thus all classes are apt to be unable to normally perform the function of propagation.

The influences of civilization on more general development are in restraint of muscular force, and by liability to disease from deficient vitality and abnormal susceptibility. I think it is fair to assume that the quality of the muscular fibre, whether voluntary or involuntary, is similar throughout the frame of a woman; and, in detail, that the muscularity of the uterus is proportionate to that elsewhere. From the habits of civilization, the muscular element must be feeble compared with the normal, except in the case of those who toil, as in farming and charwomen, &c.; while these too, especially the latter, as inhabitants of cities, are subject to weakening influences. Thus, the general muscular power being deficient, labour is effected with difficulty, and as an excessive strain, and not a natural physiological function. Therefore, spasmodic contractions of muscular fibres, with nerve cramp, occur, and the os is not readily and quickly dilated and the child advanced; but the strength is worn out by pain and inefficiency. Sudden and perhaps excessive muscular contraction ensues, or the instruments are applied, the parts being first bruised by undue delay, and then, perhaps, lacerated by rapid dilatation, and abnormal results accrue.

Nor must we overlook the influence of cold on woman. In civilization, women are so accustomed as to need reliable shelter, and constant protection proportionate to the atmospheric conditions; should they not receive them they are chilled, and the system is affected. Yet the animal nature is liable to assert itself, and such caution is omitted; or, it may be, is impossible. Should, then, a woman be wetted, or chilled at the time of the monthly discharge, the shock to the system may check it, and, the several organs being thrown out of gear, illness results. This may be inflammatory, as peritonitis, from contraction of the tubes and the effusion of tubal or ovarian discharge into the peritoneal cavity; or, in the direction of cessation of sufficient blood-supply, by contraction of the blood-vessels of the endo-metrium and ovary, when the catamenia may cease, and liability exists to its non-restoration, whence sterility.

On the part of the child, a higher intellectual heredity tends to promote increase in size of the foetal head, so that child-bearing is rendered unduly difficult by the mother's own deficiency in perfect uterine development, and lack of muscular force, in relation to a child of perhaps increased size of head. Hence, undue prolongation of labour, bruising, injuries, and lacerations, under which conditions the constantly present septic agents have a virulent power in producing blood-poisoning. Thus are present:—Congenital and subsequent deficiency of formation; abnormal influences of civilized life; deficiency of marriage; difficulty in child-birth; septic influences; which separately, or conjointly, hinder the propagation of the race, and cause disease in woman.

A diseased state arrived at in most, if not all, cases in which inflammatory disease evolves is endo-metritis. Its causation is various, but its effects are the same. The causes of endo-metritis may be regarded as probably mainly incidental to the conditions of civilization, and may be generally classed as—(1) Developmental, (2) Mechanical, (3) Sexual, (4) Accidental, (5) Parturient.

(1.) The first of these, the developmental, may be regarded largely as hereditary. If the opening of the mouth of the uterus be deficient in size for the ready escape of the discharges, the accumulation in the cavity excites muscular contraction, and thus irritation; whence presently, congestion and an inflamed lining membrane, *i.e.*, endo-metritis. With this stay in the formation of the canal, is frequently combined cessation of development in the position of the uterus, so that the ante flexion, which is normal to the foetus, has not at puberty, or later, assumed the straighter position, but still remains tightly ante flexed, so that both fundus and cervix look forward. It is evident that, on the occurrence of the catamenia, these discharges cannot escape through a canal closed, as when a piece of rubber-tubing is bent, so readily as if it were straight. Nature assists the necessary process of expulsion by muscular contraction of the fundus, whence ensue irritation, congestion, and endo-metritis. Such deficient developments are, no doubt, facilitated by the restrained movements and feelings incidental to girls brought up in the careful and delicately-minded manner desired by parents of advanced civilization. The child is taught to be gentle and ladylike, to be most careful in speech; all sexual thoughts are absent, or restrained; and her companions, especially as she grows, and at school, are those of her own sex. Thus, the mind and the body are not sexually stimulated by surroundings common to women in a state of nature.

(2.) Nor are mechanical influences absent. In the hours of her study, the position mainly assumed is the leaning forward over a desk, as in reading and

writing, when the influence must be to compress the uterus into the pelvis, *i.e.*, to maintain its anteflexed state. Lest, as puberty arrives, Nature's development might overcome these previous restraining influences, fashion in dress compresses the female form so as to press the intestines downwards; and lest these should lie forward, a powerful steel so acts as to compel pressure on the fundus uteri, and thus tends to perpetuate the anteflexion. Moreover, the weight of clothes suspended from the waist, weighing many pounds, makes still further in this direction.

It might be said that the above conditions rather apply to the wealthier classes; but the influence of our time is of a levelling kind, when one seeks to appear equal to another, and thus habits are similar. But the position is exaggerated in the case of factory girls working at sewing machines, who lean forward, and so work their legs or arms as to produce an intermittent, though rapidly recurrent strain on the lower body. These mechanical influences have frequently an undue power from a deficiency of antagonistic normal force: from deficient nutrition, whether from feeble appetite, deficient food, as at lunch time for factory girls, or improper diet, as excessive or hot tea; such being assisted by blood-poisoning, from absorption of faecal moisture from neglect in evacuation; hence anæmia, and deficient development in the sexual organs, and in muscular power.

(3.) The sexual causation of endo-metritis arises from the normal satisfaction of passion by marriage and pregnancy at due age being withheld; for, no doubt, largely from the expense of civilized living, more than 53 per cent. of women between the ages of fifteen and forty-five are unmarried in Victoria. Doubtless, from deficient development in civilization, a large number of these are passionless; but in many this is not so. In these, desire induces congestion, frequent and perhaps almost continuous. Nature would effect pregnancy, whereby the uterus would be occupied by its healthy functions, in the development of the foetus; but, in its absence, such congestion leads to inflammation, and thus to endo-metritis. The same result may accrue from excess of congress, a condition of civilization, as in prostitutes. Thus also from gonorrhœa, in which the gonococcus is the exciting cause, but which is apparently absent from the native race till introduced by the advent of civilization.

(4.) Were the muscular power normally developed, and undue pressure of posture and of dress absent, it may be supposed that the uterus would be able to maintain its position under the influence of shocks and strains; yet, when not so developed, sudden jars, as the fall from a horse or backwards in skating, may effect the backward flexion of the uterus, a condition rendered more probable from the distension of the bladder, which the presence of society may have induced, from a sense of civilized delicacy. Hence ensues congestion, and such degree of mechanical closure of the canal as requires muscular uterine force to effect the passage of the discharges; thus irritation and endo-metritis.

The above causations are liable to occur in the virgin, though the evolution into more advanced stages may continue in the marital life. Hence, I would designate these as "virginal," as distinguished from those which are attributable to the effect of child-bearing.

(5.) Of parturient causation. Given the pressure of any of the above conditions, it is evident that the canal is not in a normal condition to permit the marvellous distension of the opening required in parturition. The condition has become rather that of rubber deteriorated by atmospheric

influences, than of good rubber ; it is incapable of normal stretching, and of contraction to its natural size, but rather splits, and this we call "laceration," which may extend deeply into the cervix.

Nor, as a cause of this state, must we overlook the fact, that civilization has probably so developed the fetal head, that its circumference is probably greater than that in the native races, and thus in the less capable uterus occurs a greater strain ; and particularly in the birth of males, to which cause Simpson imputes the deaths of 3,000 to 4,000 mothers, and 46,000 to 47,000 children in five years in Great Britain.

By such laceration raw surfaces are induced, and their separation is maintained by the lochial discharges lying between them, aided by the tight binders, which civilization delights in for the supposed resumption of firm abdominal walls ; thereby, pressure is applied to the large uterus, so that it is forced downwards ; but the junction of the vagina with the cervix restraining it, the faces of the lacerated cervix are pressed outwards and the inner tissues downwards, whereby the raw surfaces are held separated, when otherwise healing by first intention might occur ; also, apposition being prevented, healing by suppuration is difficult. When the woman presently walks, the same separation of surfaces results from the similar conditions. These surfaces being raw after parturition, and absolute antisepticism being practically impossible, a discharge occurs from inflammatory action, which some degree of increased temperature may indicate, and the normal involution is hindered or prevented. Thus the restitution of the normal uterine mucosa is impeded, and endo-metritis from sub-involution ensues.

Any condition producing a raised temperature after parturition, as laceration of the perinæum and septicism, may produce a similar sub-involution and endo-metritis.

Nor, given some of the preceding debilities and the preservation of life by the skill and care of civilization, must be omitted the undue strain of lactation on a weakly mother ; for, as full recovery from parturition requires from six to eight weeks, if the strength of the mother be given to the excessive lactation which is so common, or if she be so deficient in vitality as to be unfit to nurse, involution may suffer and the uterus not regain its normal condition. From such strain the digestive system may suffer ; and hence constipation, absorption of faecal moisture, fouling of blood, debility, sub-involution, and endo-metritis.

From some such causes, we find a common standpoint arrived at, viz., endo-metritis, and from this state, the evolution of disease is apt to be regular in its action, and continuous. A main road and several side paths of pathological progress obtain, any one of which, as well as the chief, tend toward advanced disease or death.

Endo-metritis being thus produced, a thickening of the lining membrane exists. This, at the inner os, tends to impede the escape of the discharge, and induce increased contraction and endo-metritis. In the conditions in which the external opening is small, the membrane of the cervix becomes also thickened, and the escape of the secretions is still further thereby hindered. The increased muscular uterine force thus required depresses the inflamed tissue at the opening and everts it, so that it projects into the vaginal sac. It here is exposed to the acid secretion of the vagina, whereby increased irritation follows, and the surface epithelial scales become removed ; thereby the cervical glands are the more inflamed, and pour out their secretion in excessive quantity, and of a consistence dense, cohesive, and continuous, like

the uncooked white of egg. By the continued muscular pressure from above, the more induced by the increased obstruction at the outer os, the inflamed cervical membrane is the more extruded, and the os in this way may become greatly enlarged; yet the opening appears closed by the everted cervical membrane, which is thus granular, and may resemble a rubbed raspberry or raw beef. In this case, it may be difficult to distinguish its true condition, apart from the history and possible existence of a hymen, from the effects of a laceration of the cervix. Should the endo-metritis have arisen from a laceration of the cervix, the same result obtains; but the split having already enlarged the opening, and the raw surfaces not having cohered, and the vaginal junction having in the erect position pulled the surface apart, the eversion is at once produced, and the surface is granular or raw-looking from the time of parturition. Moreover, sub-involution almost always results from such laceration, probably from the irritation to the exposed nerves and the drain on the system from the constant discharge; the body of the uterus is heavy and excessive in length, particularly if measured having regard to the everted cervical tissue; the vagina apt to be lax; and the uterus bearing down, showing that the uterine ligaments have not regained their normal shortness. Therefore follow excessive uterine weight and pressure on the vaginal junction and deficient support; and hence additional pulling outwards of the cervical walls and exposure and eversion of the cervical tissue. Thus, from each cause of the endo-metritis, there ensues eversion of cervical tissue, with denuding of such membrane of its epithelial cells and a granular surface.

By the normal movements of the body in the erect position this granular everted tissue is constantly frictioned against the vaginal tissue. As the constitution has suffered by the pain and drain, indigestion and constipation have occurred, so that the rectum has lost its muscular tone, and the stools are apt to be retained there. This fecal mass offers an additional body against which the granular os may rub, and hence is produced increased irritation. The part is already congested or inflamed, and cells are now rapidly developed on and beneath the granular surface. On the granular surface they may be mucous and purulent; in the connective tissue, of a fibrous kind, which may become so densely packed as to seem fibroid, but usually the tissue bleeds vigorously when cut. By such cellular development the eversion is largely increased, so that, whereas in the earlier stage, particularly in lacerations, the lips can readily be placed in opposition, the hinge is now so impeded by areolar hyperplasia, that they can with difficulty be raised; and each lip presents a dense and convex raw surface, perhaps in part skinned over by Nature's attempt at healing. This hyperplastic tissue is apt to compress the outlets of the cervical glands, so that their secretions, degenerated by the irritation of eclosure, collect, and may be known as *Folliculæ Nabothii*. Their presence compresses and irritates the nerve extremities, and gives rise to a sense of tension.

The progress of the evolution has now induced endo-metritis, eversion of granular tissue, and areolar hyperplasia; and, in the case of a parous woman, sub-involution. It therefore must be that the uterine weight is excessive, and the body tends to descend. Such descent must be in the axis of the pelvis; yet it may be, in cases where the uterus previously tended to be ante-flexed, that the heavy fundus may lie over in that position on the bladder and so compress it, thereby producing irritation, resulting in cystitis and congestion and suppuration of the kidneys. I have removed kidneys in this state, in which the original condition appeared to have been such state

of the uterus; or, to some extent in the virginal states, but particularly in the parous affected also with sub-involution, not only of the uterus, but also of the uterine ligaments and peritoneal folds, the vagina, vaginal opening, and perinæum, or with its laceration, so that while the weight of the uterus is increased the power and influence of its supports are greatly diminished, the uterus descending in the axis of the pelvis, and occupying a lower plane, the os and fundus may look a little forward, the posterior surface being convex. Presently the fundus falls a little farther back, a movement aided by some distension of the bladder by urine. The os now looks downwards and forwards, and the fundus rests on the rectum; it is retroversion. A stool coming down, presses on the superior and anterior part of the fundus, and the neck being supported by the vaginal junction, the fundus is forced downwards by the descending fæces, and retroflexion ensues. By this pressure of the retroflexed uterus on the rectum, constipation is increased, and a more or less constant fecal mass in the rectum increases and completes the misplacement. By this retroflexion the nutrition of the organ is still further impeded, the weight and congestion are increased by the difficulty of return of the venous blood, and the escape of secretions is the more impeded by additional obstruction of the canal by its flexion. Should descent continue, and particularly if the perinæum be lacerated, the uterus continues to advance in the axes of the middle and outlet of the pelvis, and the result is prolapse of the uterus, of the bladder with the anterior wall of the vagina, and of the posterior vaginal wall and anterior wall of the rectum.

The thickened condition of the mucosa in endo-metritis is apt to block the entrance of the Fallopian tubes, which normally but admit a bristle, so that the secretions accumulate in them. Their lining membrane is thereby irritated and congested, and being further weighted by fluid contents, they are unduly heavy. Thus these tubes, which in health are light and move freely, are weighted and descend, and may frequently be felt thus enlarged and depressed at the sides of, and posterior to, the uterus. By this misplacement is formed an angle of flexion of the tubes with the uterus, which still further hinders the normal passage of their fluid contents into the uterus. It follows that, in such a state, the spermatozoa can with difficulty enter and pass through the tubes, nor are these readily able to apply themselves to the maturing Graafian follicles; and hence probable sterility.

Yet such obstruction at the uterine extremity of the tube may be intermittent, and the tube may at times be patent. The spermatozoa may traverse it, and impregnate the ovum, which enters the tube. The additional congestion concurrent with this impregnation may reinduce the closure, which may prevent the ovum from completing its passage; hence the impregnated ovum may remain in the tube and develop as an extra-uterine foetation. Presently rupture of the sac occurs, and effusion of blood takes place, either through the distal end or wall of the tube, producing peritoneal or intercellular hæmatocele, with perhaps peritonitis and extensive adhesions, or death. Should the hæmorrhage be less extensive, or the impregnated ovum not have entered the tube, the extra-uterine pregnancy may become abdominal.

But should the closure of the tube at the uterine end be of a more continuous kind, the accumulating secretions may collect therein, and pressure continuing, discharge themselves into the peritoneal cavity, when the violence of the immediately ensuing peritonitis will be determined by the virulence of the discharge. On two occasions, on opening the abdomen for this condition in gonorrhœal salpingitis, I have found the distal extremities dropping gonorrhœal pus in this manner. Similarly, the distension and

dropping into the peritoneum of contents ensue from closure of the mouth of the uterus, or of the vagina, from congenital deficiency, or from closure from contraction, or after a repairing operation on the cervix, when the simple expedient of preventing the complete adhesion of the divided surfaces has not been attended to.

When, by such discharge of tubal contents into the peritoneum, or other similar cause, peritonitis has occurred and lymph been effused, the distal extremity of the Fallopian tube may be closed, the secretions accumulate in the tube, so that it becomes a sac, containing such fluid as the condition of the membrane has formed; hence hydro-salpinx, or pyo-salpinx, the latter especially from gonorrhœa. The fluid increases, the walls are distended and thinned, and it becomes a question of least resistance as to whether the fluid escapes by the proximal extremity of the tube into the uterus, by the distal extremity into the peritoneal cavity, or through the bursting wall into the peritoneal cavity; or, by adhesions previously formed, into the intestine, the bladder, the vagina, or through the abdominal wall. In any of the above cases the peritonitis is symptomatic of the escape into it of fluids abnormal to it. Again, when the tube, being heavy and displaced, fails to adapt itself to the ovarian site, peritonitis may be caused by the falling of the contents of the Graafian follicle into the peritoneum. Such peritonitis, however caused, may, by effusion of lymph, bind down and occlude the distal ends of the tubes; and I have found them adherent to each other posterior to the uterus.

Peritonitis having occurred, whether from irritant fluid having escaped from the distal ends of the Fallopian tubes, through its walls, or from a Graafian follicle discharging into the peritoneum, the wall of the ovary is implicated in the inflammation. It becomes less elastic, dense, and permits the rupture from pressure of the distending Graafian follicle with greater difficulty, or prevents it. To effect such rupture, the forces of its distension by internal congestion and additional escape of blood and its own secretions, are increased; so that, should they effect their object, the fluids poured out are larger in quantity and of a more irritating character than is normal. Should the Fallopian tube not be adapted, or be closed, and not receive them, they fall into the peritoneum and produce peritonitis; and the ovarian wall at the opening into the follicle having taken the form of a dense lid, of which the unsplit base forms a spoilt hinge, the acrid discharges of the follicle continue to fall into the peritoneum, so that a continuous irritation occurs. I have found this condition in several cases in which I have opened the abdomen, when the temperature had gradually reached 104° – 105° , and was rising. If recovery occur from such peritonitis, similar attacks may be recurrent.

But such Graafian follicles, in spite of Nature's efforts, may, from the excessive inflammatory density of the ovarian wall, fail to rupture, when the ovaries may be found to have one or more red or purple prominences of the size of a hazel-nut, which are these unruptured Graafian follicles, distended by their effused blood. With or without this may be found similarly formed cysts in the ovary, in which the colouring matter of the blood has been absorbed, and this chronic unburst follicle contains clear yellowish fluid, and the stroma is dense. In cases of more advanced absorption of the follicular fluid and atrophy of the stroma, the ovary is composed of a few such sacs and of intervening stroma, thin but dense. The pressure of the unburst follicles has obstructed the development of other Graafian follicles, and they have atrophied, so that the whole ovary appears to consist of a dense outer layer,

small cysts and cirrlosed dividing stroma, the whole being large or small, according to the stage or determination of the individual progress. These cysts are liable to rupture, and to cause peritonitis; or, by excess of tension and inability to rupture from density of peritonitic adhesions, to produce such nerve irritation, pain, and intermittent inflammation as to cause persistent invalidism with periodic exacerbations. When the evolving disease has been induced by gonorrhœa the contents of the ovary may, by contagion through the tube, be purulent, and the organ become an abscess sac; whence again may ensue peritonitis, adhesions, &c., as the structures yield in the direction of least resistance.

It has been above mentioned that peritonitis, which is never idiopathic, but is to be regarded as always symptomatic of another affection, is induced by the effusion into the peritoneal cavity of an irritating fluid; or of a fluid, as a large quantity of blood, which, from its bulk, presently ceases, by deficiency of nutrition, to retain its vitality, and thus dies and becomes septic. In the milder degrees of acerbity of the foreign matter, both in quality and quantity, the peritoneum may absorb it, and the membrane regain its normal state, or be but slightly thickened. In the case of a more active irritant, lymph may be effused and encyst the foreign fluid. This may be absorbed, remain much as it is, or become purulent; remain stationary as a cold abscess, or increase and burst in the direction of least resistance. Such lymph may bind together and fix adjacent parts, perhaps in abnormal situations, as the ovaries, tubes, or uterus; and as absorption of the serum in the lymph bands occurs, they may become dense and contracted, and form a tense cord, like a violin string or band, stretching over some part of intestine, hinder the passage of gas and fæces, and induce constriction of the bowel, effusion of fæcal-tainted serum, renewed peritonitis, and death. Or the peritonitis, when the irritant effusion is of a violently septic kind, as gonorrhœal matter, or of blood of a quantity so great as to be incapable of nutrition and continued vitality, so that it becomes gangrenous, will induce the out-pouring of a more or less flaky and semi-purulent serum; and, if this is not speedily drained, probably by abdominal section, cause death, it may be in thirty-six to forty-eight hours.

The foregoing are the ordinary conditions of disease which we may daily see in various stages of evolution, and are such as tend by their inherent conditions to so progress, and frequently cause sterility. But the influence is not thus limited. Endo-metritis of the cervix, producing limited eversion, may by muscular contraction elongate a loose portion, whence results a mucous polypus. Should pregnancy occur, with endo-metritis of the body of the uterus, the capacity of growth of the decidua reflexa may be deficient; whence, from insufficient nutrition of the ovum, its death results and abortion.

If the development of the blood-vessels of the placenta be below the normal standard, or they be so badly nourished as to become fattily degenerated, they are liable to rupture, and abortion may occur. If the hæmorrhage be less extensive, the effused blood may be absorbed, but cohesion of the placenta and uterine wall take place; so that, on delivery, pieces of placenta are adherent and retained, which, if becoming septic, produce blood-poisoning; whence, it may be, phlebitis and phlegmasia dolens, thrombosis and cardiac obstruction or pulmonary embolism. Should the phlebitis be suppurative, besides the above states, the passage of the pus into the general blood circulation may induce joint and other suppurations. The lymphatic absorption of such septic elements may cause that compara-

tively rare affection, pelvic cellulitis, or other conditions incident to puerperal septicæmia; or there may be secondary puerperal hæmorrhage. Again, the deficiency of nutrition of the fœtus may cause its death, but, the chorion surviving, hydatidiform degeneration may result, causing hæmorrhage. Its expulsion may presently ensue; but should its attachment be deep, from the uterine structure having grown with pathological hyperplasia around the villi, pieces of it may be retained, and hæmorrhage persist; should such pieces become septic, blood-poisoning will result.

After delivery with such endo-metritis the normal fatty degeneration and absorption of the uterine mucous membrane may be deficient; or morsels of retained adherent placenta may remain, live and further develop, whence polypoid outgrowths result, which are not unusual at the placental site; and frequent hæmorrhage, or menorrhagia.

The effects of this imperfect blood supply may too be seen in the fœtus, when it has been sufficient to maintain the life of the ovum, but not good enough to develop it normally, and thus a hydrocephalic head may be produced; such congenital deficiency may perhaps occur in other parts of its body.

Malignant growths of the endo-metrium may occur in such a state, but will be mentioned hereafter.

Of lacerated cervix, the immediate effect in labour may be hæmorrhage from the split surfaces, which may appear to be from the cavity of the uterus, and may cause death. If the opening gape from the split, and the endo-metrium be moderately healthy, pregnancy may occur with much readiness from the easy entrance of the sperm; but when the angle of laceration or hinge of the lips is deep in the cervix the irritation resulting from the development of the ovum in the cavity of the uterus frequently induces abortion, or premature labour. On the other hand, when eversion of the lining membrane or areolar hyperplasia have blocked the opening, the semen does not enter, and sterility results.

The granular os, whether virginal or from laceration of the cervix, with its everted, hyperplastic, raw beef-looking, discharging face, necessarily creates nerve irritation, and a constant and heavy drain on the system; and thus poverty of blood and anæmia, deficient nerve nutrition, and diseased nerve action; whence neuralgias, especially of the back, nape, and head. To such an extent may such diseased nerve force occur that I have had a case of melancholia which was for six months in a lunatic asylum; on the day following the operation which removed the condition the patient was sane and recovery complete. No cause, other than the removal of the apparent cause of irritation, could be assigned for the recovery, unless it were assumed that the administration of chloroform cured her, which is not to be granted, for it had been previously exhibited without improvement. Therefore, the presence of the exposed lacerated faces and evolved conditions can produce even insanity; and, similarly, the virginal granular os, accentuated by non-marriage.

So far as my experience goes malignant disease of these organs is invariably preceded by some condition of irritation herein mentioned. The site of cancer is by far most common on the cervix, and, so far as I have been able to judge, always on a granular surface. The line of evolution is as follows:—The occurrence of the raw surface is as before described, whereby an abundance of mucus, pus, and gland cells is formed, of irregular shape and size, proportionate to the rapidity of their formation or debility of nutrition. Should the patient have the inherent capacity of creating the cancerous cell

all the conditions are present for its production on this site, and the part becomes cancerous. No doubt it is probable that the heredity must be cancerous; but as it is certain that every one's ancestors have died, and of various diseases, and that the families of mankind are allied by marriage, and that cancer is very prevalent, I think it follows that no family can be shown to be free from a cancerous taint, ready to develop under favourable conditions. Such a state is furnished by the granular os, constantly chafed against the vaginal wall, and hence this is so common a site of malignant growth. Yet it may be that the cancer does not primarily develop on the granular os, but on the vaginal wall against which it rubs. Or the acrid discharges from the granular os may irritate the vulva, and the cancer grow there, perhaps preceded by boils due to the same cause.

Cancer of the endo-metrium of the fundus is much rarer, perhaps because of the absence of friction, and the frequent co-existence of a granular os, and thus it is apt to first appear on the site of greater irritation; yet it may occur higher, and there on the part of greater hyperplasia, as preferably on the sub-involuted and chronically inflamed placental site. Similarly, it is not rare to meet with it about ovaries diseased as above mentioned, when the state of excessive cell development in their structure or on their surfaces may present a site on which the rapid low form of cell development may readily give place, under the constitutional capacity, to the malignant type. Such cancer may readily implicate the glands of the mesentery and pancreas, and produce growths about the intestines and inner surfaces of the abdominal walls, and perhaps of the breast. I have seen them coincident. Malignant disease, extending to the abdominal cavity, readily evolves into a low peritonitis, the veins become obstructed, ascites occurs, œdema of the legs, and presently death.

The sub-involution that results from the before-mentioned conditions does not alone affect the uterus. All the parts and organs which have undergone the normal hypertrophy or alteration of pregnancy are liable to fail to regain the antecedent state. Thus the blood may retain its deficiency in red corpuscles; anæmia and mal-nutrition, inclusive of the nerves, occur; the left ventricle of the heart remains enlarged, lax, flabby, and feeble; the vaginal, the abdominal and general muscles, the muscular fibres of the abdominal organs, the ligaments and the peritoneal folds be lax and weak, and not regain their former tonicity and supporting power. All these deficiencies may be exaggerated after a subsequent abortion or labour. The influence of an impregnated ovum, descending into the enlarged cavity of such a sub-involuted uterus, is that, instead of being supported in the higher uterine segment, and so of adhering there and growing, it tends to fall, and, perhaps meeting with the required resistance in the lower segment, may there attach itself and develop the placental site near the upper cervical opening, producing placenta prævia.

The retroflexed fundus may be free in the pelvic cavity, or may, by inter-current peritonitis, be bound down in this position by layers or bands of organised lymph. From such misplacement results difficulty of entrance of the sperm, whence, perhaps, sterility.

Should pregnancy occur in a retroflexed uterus bound down by peritonitic adhesions, the uterus is likely to be unable to rise in development, and abortion be the best issue; yet septicæmia is probable. Should such adhesions not be present the uterus may in its development, if the angle of flexion be not too acute, regain its normal situation. If this do not occur, the fundus enlarging, the irritation may induce abortion. In the absence of abortion,

pressure on other organs occurs. This is apt to be particularly effective on the urethra, so that there are retention of urine, distension of the bladder, and overflow of urine from over-distension, and thus incontinence. Hence undue pressure on the mucous membrane of the bladder, interference with its circulation and nutrition, and gangrene. The lining membrane may thus be cast off in its entirety, or in shreds, leaving the underlying muscular tissue in a state of exposure and suppuration; whence death from gradual irritation and drain. By retention of urine thus induced, the ureters are distended, the calices of the kidneys dilated, the cortex engorged, and degenerative changes, congestion, and chronic inflammation produced; whence liability to Bright's disease and dropsy, or suppuration of the kidney.

The intense vitality of the uterus in the propagation of the race cannot be suspended by the conditions of civilization with impunity. If the uterus do not occupy itself with the production of children, it may develop its structures in other directions; hence growths of muscular tumours. Thus such tumours are more usually found in the virgin from non-marriage; or the sterile married woman, whether from congenital deficiency of the opening, or maintained fetal ante-flexion of the uterus, or deferred marriage, with evolved disease, or from the incapacity of the husband. Such tumour will be more or less oedematous from the proportionate difficulty of the return of blood from pressure on the veins by the tumour, or from the muscular irritation produced by difficulty of escape of uterine discharges from the smallness of calibre or flexion of the canal.

Should such tumour, by its own redundancy of growth and consequent pressure, as when it packs the pelvis, be deficiently nourished its structure may commence to break down, and, by absorption, blood-poisoning occur. This may be induced by any means adopted for its arrest of growth as may cause even slight destruction of tissue, as electricity by puncture. This will the more readily occur if septic germs be simultaneously introduced by the electrode or trocar. When the cells of such a myomatous tumour burst into its internal structure, after the manner of the normal development of a glandular secretion, the tumour will be of the fibro-cystic kind. Such tumours frequently so fill the pelvis, or even the abdominal cavity, as to produce serious pressure on the excretive canals, as on the urethra, bladder, ureters, or kidneys, when their inflammation and disorganisation may ensue, and dropsy; or on the rectum or intestines, causing more or less stoppage of the action of the bowels; or on the veins, inducing anasarca.

Such, then, is the evolution of disease in the uterus and appendages, as naturally tends in civilization to the needful limitation of the propagation of the race. In the earlier state these diseases are slight and remediable; in the latter, most serious, and often death-producing. Their progress and evolution are apt to be insidious, but continuous, and it is only by a constant appreciation thereof that we can realise that the various phases which come before us are to be regarded as stages of one progressive diseased action, and not as so many independent affections.

On the Treatment of the Inflammatory Diseases of Evolution of the Uterus and Appendages.

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FROM a consideration of the evolution of the inflammatory diseases of the uterus and appendages, it will be found that a case presents some stage or combination of the following conditions:—

1. Endometritis, resulting from or coincident with—

- (a) Virginal deficiency of development in the size of the opening of the uterus, maintenance of foetal antelexion, or post parous return thereto; mechanical influences; sexual influences, particularly absence of marriage and gonorrhœa; and accidental influences, with or without granular eversion and areolar hyperplasia, and increased weight of the uterus.
- (b) Parous laceration, or operative division of the cervix, with subsequent eversion, granular face, areolar hyperplasia, sub-involution, and increased weight of uterus.

2. Descent of the uterus, vagina, and rectum, of which the stages are the perpendicular, retroversion, retroflexion (with or without adhesions), and prolapse, according to the axis of the pelvis which the uterus occupies, and, in the last case, vesicocele and rectocele.

3. Congestive or inflammatory enlargement of the tubes and ovaries, usually with more or less posterior displacement.

4. Pelvic peritonitis, with effusion of serum or lymph, or of these mingled with pus. Such lymph may cause the adhesion of adjacent parts, or may enclose collections of serum or pus.

I would submit that the objects to be effected are, if possible, the cure of the conditions present, and the prevention of the farther evolution of disease, so that the organs may be preserved in their complete condition and with uninjured functions; and that these may be thus induced—

1. Ensure free and permanent drainage of the uterine canal.
2. Produce a healthy state of the endometrium.
3. Heal all granulations of the os and cervix, remove areolar hyperplastic thickenings, bring lacerated surfaces normally together, and thus reduce the undue weight of the uterus.
4. Support the uterus when required.
5. Reduce abdominal pressure to the minimum.
6. Induce general involution of the body by strengthening the system.
7. Where the previous measures have failed, and the disease is persistent or dangerous, remove the ovaries and tubes.

The first proposition, to ensure free and permanent drainage by the uterine canal, is palpably necessary where the endometritis is due to deficient development in size of the external opening, with persistence of foetal ante-

flexion. It is not less essential in the virginal granular overgrowth, which blocks the outer opening; and in the endometritis coincident with lacerated cervix, for here, too, the inner os is apt to be tight, and the opening rendered valvular by the thickening of the endometrium; so, too, is the external opening often constricted in the partial healing by contraction of the torn surface at the level of the unsplit part of the canal, and by the areolar hyperplastic thickening.

Such drainage can only be effected by the openings of the inner and outer os being free and patent, as well as the canal between and above them. Thus, are required the measures necessary for the removal of such hyperplastic growths as obstruct such openings and canal, and of what flexions deficient congenital development, or the descent from undue weight of the uterus may have caused. It therefore follows that the endometrium must be made healthy and the uterus straightened or lightened, so as to maintain an open canal, and permit the ready escape of the discharges. Thus, the effecting of the first proposition of drainage may entail the enlargement of the canal, as well as the carrying out of the second proposition, viz., the producing a healthy state of the endometrium; of the third, the healing of all granulations of the os and cervix, removing areolar hyperplastic thickenings, bringing lacerated surfaces normally together, and thus reducing undue weight of the uterus; of the fourth, the supporting of the uterus, as well as the removal of flexion when present; and of the fifth, the reduction to the minimum of abdominal pressure.

By such means alone can permanent drainage be gained, for the omission of any part thereof permits a speedy recurrence to much of the previous diseased action.

The mode in which drainage may primarily be induced is in all cases by enlargement of the canal where deficient in calibre. This may be done by cutting or by stretching; and without bringing forward the deficiencies or injurious influences of cutting, I would point out that it is wise, where possible, to follow the manner that nature adopts, which is invariably dilatation; and again, nature, when she is able to effect pregnancy under the circumstances of the above difficulties, not infrequently cures them by the dilatation occurring in the subsequent labour.

Assuming, then, that dilatation is desirable, which mode is preferable? Here, again, nature indicates by the finger-like action of the membranes in labour, that a continuous circle, producing equal pressure at each point of its circumference, dilates in the best and safest manner; and this we should anticipate when we consider the matter theoretically and practically. In view of the fact that in effecting such dilatation it is well to act with all safe rapidity, that nothing is gained in this instance by the dilating medium being fluid, and that solid stems are in every way most convenient, it will be found that Hégar's, or a combination thereof with Godson's graded dilators, effect the purpose in the readiest and most efficient manner.

The second step necessary to drain the Fallopian tubes, as well as to remove hypertrophic valvular obstructions at the inner os, is the removal of the thickened uterine lining membrane. It seems to me unnecessary to argue as to whether such removal may be effected by some destructive chemical re-agent or the actual cautery, preferring again to accept nature's mode. As nature removes the uterine lining membrane at the catamenial period and after labour, so may we mechanically, cleanly, and practically, certainly clean away by scraping, *i.e.*, curetting, after which nature will replace the diseased lining membrane by a normal and healthy growth.

The third step for drainage is the removal of all granulations of the os and cervix and areolar hyperplastic thickenings, which by their pressure and eversion impede the ready escape of the discharges, and induce by their continued irritation a recurrence of the closure from renewed induration; and healing of the raw surfaces, as well in the virginal cervicitis as in the lacerated cervix. To effect this, is it more desirable to employ chemical caustic re-agents, or the actual cautery, or rather to have accurately-defined clean-cut surfaces, by taking away exactly as much tissue as is desirable, and bringing together the healthy raw surfaces, which at once heal, whereby the parts are at once and certainly restored to the condition of their original formation, after the manner of the operation introduced so happily and effectively by Dr. Emmet. It seems to me that the latter course has everything in its favour; for, amongst other considerations, nature habitually heals, by simple cohesion, healthy clean-cut surfaces, and they remain so united without further irritation; while, in the case of other forms of removal or destruction of tissue, healing can only be by suppuration with inflammatory actions, low in kind, slow in action, and uncertain in results. Again, should such removal be effected by scissors or the knife? In the case of freshly lacerated surfaces it matters little how the surfaces are vivified, and the central line corresponding to the canal may be left unremoved; but where inflammatory induration and thickening have occurred, the tissue of the whole surface must be equally levelled, else would the uncut surfaces remain as ridges marking the site of the canal, which, pressing each other, would practically close that which should be a tube. To effect such removal it has to me been most convenient to pare the tissue equally, and according to the requirements of the particular case. The latter part of the third proposition, the reduction of undue weight of the uterus, necessarily follows upon the successful performance of the above-mentioned measures. In the virginal affection, the increased weight is due to the increased quantity of blood contained in the inflamed uterus, and to the inflammatory products; their removal, therefore, relieves their result. In the case of the lacerated cervix with sub-involution, the same results obtain, though the canal of the uterus may afterwards in some cases still remain a little long on measurement. The undue weight of the uterus having been reduced by the before-mentioned treatment, posterior displacements which are replaceable will frequently be found to be cured by this lightening of the uterus and appendages, permitting the uterus to re-occupy the axis of the brim. In the virginal state marriage is now desirable, particularly in the case of the normal degree of sexual desire, when pregnancy ensuing, normal development occurs, and the patient is cured. Should evoked disease have arrived at intermittent tubal contraction, it may be, however, that tubal ovarian, or, less probably, abdominal extra uterine foetation may result. These, however, are not to be anticipated, and it is better for the patient to take the chance of marriage and its effects. Should marriage not be convenient, the sexual desire continuing and being unsatisfied, congestion may persist, and its results evolve, nervous symptoms recur, and debility, anæmia, and insanity, usually of the sexually melancholic type, perhaps with religious or suicidal tendencies, ensue. The three remaining indications relate to the restoration of the uterus and general system to the normal conditions from the state to which the inflammatory disease has brought them.

Of these the fourth is the support of the uterus. The common states requiring such support are perpendicularity and, in a more advanced stage of evoked disease, retroversion or retroflexion. The degree of success possible will be dependent on the absence or presence of inflamed, contracted, or adherent

misplaced Fallopian tubes or ovaries, and of peritonitic adhesions, binding down the fundus in the backward position. Should a treatment of reposition and of hard pressure, as by pessaries or of dragging, as by shortening the round ligaments, &c., be adopted in conditions of such complications, it will follow that there is a pressure or tension on inflamed hypersensitive parts, which can but increase the disease and evolve new dangers.

Posterior displacements may be divided into—

- (A) The reducible, which may be defined as being capable of replacement by the finger or sound, and of retaining the normal position on removal of the sound, when lying on the side.
- (B) The non-reducible, which are those which, on the withdrawal of the sound, revert to the backward position.

Of the A class, the reducible, there are two divisions:—

(a) The virginal, in which the tubes and ovaries are heavy, and displaced posteriorly, dragging the fundus backward; and in which evolved disease has not yet resulted in peritonitis and adhesions; but in which drainage and removal of granular and hypertrophic tissues have not yet so relieved the heavy tubes as to lighten them sufficiently to enable them to rise and occupy their normal positions. Assistance to this end is required, and is best effected by a gentle application of glycerine cotton, followed by a small supporting pad of absorbent cotton. Thus they are sustained, drained, and induced to regain their former tone and position without irritation. Very few of these cases but are injured by a pessary, because of its constant pressure on the tubes and ovaries. Marriage and pregnancy will now complete the cure of many of these cases.

(b) The second division of the reducible posterior downward displacements is the class of cases of sub-involution of the uterus without adhesions, in which its supports, lengthened in pregnancy, or stretched in labour, have, by deficiency of involution, not yet regained their normal tone. Thus the ligaments remain long, the vagina is lax, and the vulval opening is unduly large by laceration of the perinæum, or non-contraction of the sphincter vaginae. In the great majority the uterus will have been retroverted or retroflexed, and the treatment by drainage and healing of lacerations produces such a narrowing of the vaginal roof, raising and lightening of the uterus, that many regain their normal position without farther assistance. In others of more persistent sub-involution of the supports, a temporary maintenance in position, with some drainage by glycerine and a small cotton pad, or by columning, and the removal of abdominal pressure, and a strongly tonic and involution treatment of the general system, will induce nature to regain her normal power. Occasionally a small non-irritating supporting pessary may be temporarily needed.

Cohabitation, but not pregnancy, in order that the strength may have time for restoration, is now indicated.

In a more advanced stage, the downward displacement, heavy retroflexion, or prolapse of the uterus is coincident with much laxity of the ligaments, and such persistent dilatation of the vagina with prolapse of its walls, vesicocoele, rectocoele, and laceration of the perinæum, that the vagina is pyramidal, and the uterine supports are wanting. Then vaginal pessaries cannot be retained, nor will a pessary, held up by external bands, effect more than a temporary support at best; for, assuming that after replacement the normal position is maintained by such a pessary, on its removal, as at night, the retroflexion recurs, and the patient herself cannot replace the uterus, and the pessary is

then ineffective and injurious. In these cases, the first needful procedure is the repairing of the perinæum, and such anterior colporrhaphy as supports the neck of the womb; and occasionally posterior colporrhaphy. Thereby the normal supports are restored, and the uterus resumes its position in the axis of the brim. It is rare that after the performance of these essential measures the position is not maintained. Yet should this not be so, Alexander's operation of shortening the round ligaments, or even of fastening the uterine horns, or broad ligaments, anteriorly by abdominal section may be indicated; but these are rarely necessary.

(B.) The non-reducible retroflexions of the uterus are those in which the uterus is held back in the cavity of the pelvis by organised lymph adhesions attached to itself and the anterior rectal wall, or by contractions or adhesions of the tubes or ovaries which drag the fundus backwards. Between these two states a practical distinction is to be drawn. In the former case it may be that organised lymph adhesions occupy Douglas' pouch, and the uterine fundus and anterior wall of the rectum are densely, closely, and permanently united. In the latter case the congested state of the tubes or ovaries may be relieved, and the fine lymph bands stretched, or, it may be, separated, so that the uterus may rise to its normal situation; and it may be that the gradual rising of the organ in pregnancy completes the removal of such bands or tubal contractions.

In such cases as these after removal of the conditions which caused the peritonitis, which resulted in the effusion and organisation of the cohesive lymph, as hereinbefore described, the gradual raising of the uterus and stretching of the adhesions is indicated. For this purpose, so far as vaginal means go, no coarse instrument as a pessary can be used without injury. In cases of this kind, even where the uterus can be replaced with the sound, and a high, much bent, perhaps glycerine pad, Greenhalgh, or other similar pessary would seem to form a crescentic back to the uterus, it will be found that the retracting power has drawn the fundus round laterally till it has become wedged tighter than before into the posterior position, the pessary being in the angle of flexion, posterior to the fundus, or displaced. In less favourable cases the irritation may induce peritonitis, the temperature rise, and even death ensue, probably from the pressure of continuous forcible replacement, or of the pessary having induced the passage of fluids from the tubes into the peritoneal cavity, or the rupture of ovarian cysts with irritating contents. Similarly no pulling up operation is possible, for such drag must be sudden, and on tender adhesions or congestive appendages, and inflammatory results ensue. Yet, by means of a persistent drain by glycerine or cotton pads, or small cylinders of wadding suitably placed, the congestion may be reduced and distensible bands stretched and deprived of their retracting power. It is a gradual influence, logical, safe, and effective, if the conditions be capable of reacting to such influences. I have many times seen such cases relieved by the consecutive above-mentioned measures to such an extent that, though the position was perhaps not normal, pregnancy effected the remaining cure, and terminated normally with regard to the immediate and subsequent conditions; and in all conditions of vaginal inflammatory diseases, in which the above-described treatment has produced a normal canal and uterine misplacement has been reasonably rectified, the usual results, marriage, with its expectation of pregnancy, is most desirable.

7. Finally, in those conditions which, by reason of the acute inflammatory stago reached in the evolution of the disease, threaten shortly to destroy life; or in which there is chronic inflammatory state with varying temperatures,

generally indicating persistent tubal formation of pus with irregular, or without, discharge into the uterus; or in which there is constant pain from the drag on peritonitic adhesions of the ovary; or from the tension of ovarian cysts, where peritonitic lymph has so coated the ovaries as to prevent the rupture of the ripe Graafian follicles; or from such adhesions of the distal extremities of the tubes as prevent their adaptation to the ovaries; in all these states the capacity of propagation is permanently destroyed, and the woman is a constant or frequent invalid, incapable of performing her marital and domestic duties. In such cases as have been either so virulent in their causation and evolution, and which are frequently gonorrhœal, or have by neglect been allowed to reach such a strait, our only resource is the removal of the appendages. Thereby no injury is done to the sexuality of the woman, for she was incapable of performing the functions of propagation, and usually of married life, by the presence of her diseased state; but general health may be restored to her, and, except for her incapacity of bearing children, she again becomes a wife. The condition is incapable of relief, but it can be removed.

With regard to the modes in which these various measures of relief or cure may be effected, I would suggest the following, which, properly carried out, may be regarded as effective and practically free from danger.

1. To ensure free and permanent drainage of the uterine canal the first step is dilatation. The patient having been prepared by relief of the bowels, and an injection of the vagina with a solution of perchloride of mercury, and ether administered, is placed on her side, but not in Sim's position; a Sim's speculum is introduced, and two light Volsellum forceps, to divide the traction, are fixed in the anterior lip, thus steadying the uterus without pulling it down; for there may be adhesions, or irritable and contracted tubes. A sound having been introduced to show the exact direction of the canal, Hegar's dilators, or better, Godson's metal followed by Hegar's dilators up to No. 12 are rapidly and consecutively introduced, avoiding any jerk as the instrument passes through the inner os.

2. To produce a healthy state of the endometrium a curette forming an ovoid ring, so that debris may escape through the hollow centre, is then gently but efficiently made to pass in successive sweeps from above downwards over the endometrium from the fundus to the os, and especially about the entrance of the tubes, so that the uterine cavity is passed over two or three times; the repetition being required to remove the ridges of hyperplastic tissue between the grooves previously made, and also the shreds which may hang partially detached. This having been accomplished, a double channel or double-tubed canula attached to a Higginson's syringe filled with a solution at 105° of 1 in 1,000 of perchloride of mercury, so as to exclude air, is passed into the uterine cavity and about a pint of the solution injected, the prevention of distension of the uterus and possible passage through the Fallopian tubes being guaranteed by the return tube. Iodoform may be applied against the os and a pad of iodoform cotton placed there. This procedure of dilatation and curetting may be completed in four or five minutes, or less. In view of the necessity of a free opening for the escape of possibly retained shreds of endometrium, of small clots and of some blood, it appears desirable not to further operate for a few days; meanwhile the vagina may be syringed night and morning with a solution of 1 in 2,000 of perchloride of mercury.

In a week the third measure may be proceeded with, viz: to heal all granulations of the os and cervix, remove areolar hyperplastic thickenings,

bring lacerated surfaces normally together, and thus reduce the undue weight of the uterus. The vagina having been previously syringed with perchloride solution, the patient is etherised, placed in Sim's position, and a Sim's speculum introduced. A tenaculum fixed in the anterior lip, free of the tissue to be removed, steadies the uterus without traction, the needful operations being performed on the parts in the situation they occupy. A pair of artery forceps, from which the spring catch has been removed, seizes and supports a morsel of the granular tissue conveniently at the right-hand side of the anterior lip, and a sharp angular vesico-vaginal fistula knife is carried through all the diseased tissue intervening between the normal edge of the face of the os and the inner circle of the raw or hyperplastic tissue where the canal is of normal size and consistence, and is then swept round the circuit of the os, removing all the diseased tissue in one piece, the same effect may be attained by making the first knife travel round half the distance, and the opposite angled knife commencing the removal at the same spot as the first, but, travelling in the opposite direction, completes the circuit. A crater of healthy freshened tissue now exists, and all diseased structure has been removed. An Emmet's slightly curved and spear-ended needle, threaded with fine lace thread carrying silver wire, is then introduced, commencing near the left angle of the hinge, from the anterior vaginal surface of the cervix through the divided surface and on through the opposing divided surface, emerging at the corresponding left posterior vaginal surface of the cervix; a second suture passes similarly nearer the line of the opening, and a third nearer still. Three corresponding sutures are placed similarly commencing near the right angle. When these sutures are drawn up, the opposing freshened surfaces are placed in exact apposition, and, when twisted, all hemorrhage is stopped by compression. The line of the canal is between the two middle sutures, and is maintained by the introduction of a slip of oiled silk, to which a piece of thread is tied for its removal. The vagina is washed out by a solution of perchloride. These procedures may take from eight to ten minutes up to their completion. If properly performed, the only risk subsequently need be the possible cohesion of the line of canal, and so of collection of fluid in the uterine canal. This is easily rectified by the passage of the sound by the aid of Sim's speculum, which will leave the opening of such a size as the nature of the case renders desirable, always remembering that it is most easy to dilate such an opening up to the requisite size, but impossible to bring up the parts to a farther and improved position, except by another similar operation. The whole of the above proceedings require rest in bed for three weeks, and in the house for a week, at the end of which time the uterus is as perfect as in a healthy virgin, and has a normal opening and face. The details of the above operation must be effected according to the amount of hyperplastic thickening, and the length of the vaginal cervix. Should the uterus still be retroflexed, the fourth indication may be desirable; but frequently the lightening by the preceding measures, with the raising of the uterus into a higher axis of the pelvis by the narrowing of the vaginal roof by bringing together the divergent lips, will enable the uterus to regain its normal situation. Should this not be so, a small glycerine pad or support of cotton wool repeated on alternate days, or less frequently, and later a small, nearly straight, Greenhalgh's pessary will, by gently supporting the posterior vaginal pouch, raise the organ into the superior axis; a small Salt's pessary, or a little air cushion will effect the same end, until the adjacent supporting structures have had time to regain more normal tone, and returning strength and weight have deposited fat to a healthier amount. As a last resource in such uncomplicated cases,

Alexander's operation of shortening the round ligaments, or the attaching of the uterine horns to the anterior pelvic walls may be performed; but such occasions do not occur to my view. Should prolapse be present, it may be necessary to perform anterior colporrhaphy, which, after Emmet's method of making the walls cohere close under the uterine cervix, has with me been always effective in maintaining the normal position; and also perineorrhaphy, which is performed most effectively and speedily by Lawson Tait's method.

But when the retroflexion is coincident with and dependent on contracted diseased tubes and ovaries, displaced, and perhaps coherent posteriorly; or is itself attached to the anterior rectal wall by organised bands of lymph, it is necessary to support the organ gently until the effects of the previous measures, adopted for drainage and reduction of congestion and weight, have had time to affect and relieve the irritable state of the tubes and ovaries; and even in cases, in which it appears certain that extensive disease has disorganised the appendages, it is frequently most surprising how great benefit is gradually experienced, and how comparatively rare it is to have to adopt an operation for their removal.

The means by which such support and continuous drainage of deep capillaries and lymphatics, blocked by inflammatory exudations, are best and most safely effected so as to relieve irritation by pressure, are by introducing a small piece of cotton saturated with glycerine, and of another large piece of dry cotton, of a size convenient to the case, below it. This should be changed every other day, and persevered in for three or four months. It may be that the uterus then appears to be movable and readily replacable by the finger or sound in Sim's position; but bands of adherent lymph, from which œdematous congestion has been drained by the glycerine pads and previous treatment, or curly adherent tubes or misplaced adherent ovaries may retract the uterus to its position of retroflexion. Many of such patients are then quite comfortable, gain flesh, and do well. Nothing farther could be done for them, unless these appendages were removed, which may be quite unnecessary; although a few exceptions may subsequently require this more serious treatment.

5. Supplementary to the support of the uterus is the reduction of abdominal pressure. This includes removal of constriction by the corsets, so that the intestines may not be pressed downwards on to the body of the uterus. To this end the form of the woman in her clothes should be the same as when out of them, and her size in her clothes proportionate to their increased dimensions; so that room exists for free respiration, as well as for the food taken at meals. This is particularly necessary in those who take vigorous exercise, as in Lawn Tennis, &c., and is particularly applicable in virginal conditions. The corsets should meet without leverage for their locking. Similarly, and of much importance in those who have borne children, is the prevention of pressure by the weight of clothes, which, bearing on the flabby and unusually fat abdominal walls, depress the intestines on to the uterus. To this end the skirts and petticoats should be carried from the shoulders. This may be effected by the use of braces or suspenders such as men wear, to the ends of which are attached large hooks, the corresponding eyes being sewn on the skirts, &c. The same end may be gained by wearing a jacket made of duck or drill or other stout material, with hooks similarly attached to the lower band; or the clothes may be worn as continuations or combinations. A well-fitting abdominal belt, firm over the symphysis pubis, and loose at the upper edge, will support lax or fat abdominal walls. A tight binder after labour is contra-indicated.

The sixth indication, to induce general involution of the body by strengthening the system, is to be attained by arranging the meals at regular and suitable times, allowing due time for digestion of each, and avoiding the taking of heavy lunches between them, which of themselves require considerable time and power of digestion. The quality too of the food is of importance, remembering that this climate is usually warm, and that heat producers are less suitable than in cold regions. Thus, while the starches and sugars in excess may be requisite and suitable in countries where the system has to make much heat to maintain its temperature, in an atmosphere of comparative warmth as in Australia, there is no such burning up of fuel to this end. The most marked example of this habit is the taking of porridge by the Scotch and Northern Irish, who do not realise that this is the diet only of northern cold countries, as the Scotch, Irish, Norwegians, Swedes, Danes, Finns, and Russians, to the conditions of whose native countries ours are not even allied. The diet which appears most to effect the end of repairing the debilitated blood, and through it of the tissues, is animal; a diet, of which the absorption is effected by creatures of the smallest digestive powers, as of milk by the young of animals; and, in the case of the carnivora, among which we, as shown in part by the formation of our teeth and stomachs, rank, by their digestion through the medium of stomachs, small in comparison with the manifold digestion of the graminivora, as the cows who chew the cud and have more than one stomach. It therefore appears indicated that an animal diet is here mainly desirable, and animal food may be taken three times a day at meals at suitable intervals; such a meal to consist of eggs, fish, meat, game, rabbit, hare, tripe, sweetbread, or such like. Between these meals may be taken from one to two quarts of milk or some beef-tea. I would suggest, as an example, the following: On waking at 6 or 7 a.m. a glass of milk. Between 8 and 9 breakfast—Animal food as mentioned above, ordinary stale bread or cold dry toast and butter, and a cup of cocoa or coffee made with milk, and not too hot. At 11, half or three-quarters of a cup of good beef-tea or soup, without bread. At 1, dinner or lunch of animal food, easily digested vegetables, and a milk pudding or stewed fruit. At 3 or 4 a cup of cocoa. At 6 or 7, dinner or tea, as lunch or breakfast; at 9 or 10 p.m. a cup of beef-tea or soup with bread. Stimulants are very dangerous to these patients; they are not necessary, and it is most easy to induce confirmed alcoholism. Not less than from 9 to 10 hours should be given to bed at night; and the woman should lie down for an hour after the lunch or dinner, from 2 to 3 and sleep or rest. She should go to bed not later than 9 or 10 p.m. For exercise, a stroll of a quarter or half an hour should be taken between 11 and 1; and of an hour or so between 3 and 5, according to the weather. A hot bath on rising in the morning of such a temperature as is comfortable according to the weather, but never cold, is desirable: and not to lie in it and soak unduly. The body is to be protected from external influences by flannel chemise and drawers, or combinations, especially Dr. Jaeger's, in the winter; and suitably in the summer according to the locality. As to drugs, the whole tendency being in the direction of debility, the only indication is in the way of tonics, unless the temperature be raised by the presence of an acute inflammatory attack. Thus, in the former case, preparations of iron and quinine are desirable; in the latter, essentially rest in bed, and perhaps sedatives; but frequently quinine in large doses best meets the condition, though in this state the cause of the inflammation being usually the outpouring of an irritant fluid into the peritoneal cavity, or septic absorption, the individual condition must be primarily considered, and treated by operative measures or otherwise. In extreme cases, Weir Mitchell's system

of massago may now be indicated. By the above strengthening measures the body will be increased in weight and power, unless the diseased conditions be such as to produce a waste of tissue beyond the possibility of their influence, and outweigh them in the balance.

In the condition of debility, when an anæsthetic is required, ether, or ether intermittently with a little chloroform, is indicated, and never chloroform by itself. Finally, in such cases as the diseased state may have so evolved as to destroy the functions and orderly working of the machinery, it may be necessary to resort to the last resource, the removal of the appendages. Such a necessity is a reflection on the skill of the physician, unless it be from the neglect of the patient, and will, comparatively, rarely be found to be necessary; but more frequently in the case of the causation having been of gonorrhœal infection.

Acute peritonitis being never idiopathic, its treatment, beyond the act of soothing influences, mild purgatives as drachm doses of sulphate of magnesia, &c., and relief of gas by the anal tube, as well as reduction of temperature and support of strength by quinine, &c., is that of the removal of the tubes and ovaries, by the effusion from which the disease was induced. Obstruction of the intestines produced by peritonitic lymph bands, of which the symptoms cannot be removed by medicinal treatment, necessitate abdominal section.

A novel method of operating for the cure of Large Ventral Herniæ, with notes of a successful case.

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IF the title of this contribution should appear at all arrogant, I trust that members will give me credit for having taken all possible trouble to ascertain whether the method of procedure, thought out and practised by me in this case, had ever been suggested or practised before by other operators. Not only have I been unable to discover any account of the method now described, but ventral herniæ of such dimensions as this one, do not appear to have been previously included in the range of operative surgery; the only treatment mentioned being that by the most suitable support that can be devised for each individual case. The distinguished surgeon who presides over the section of surgery in this Congress, has also stated to me that, so far as he is aware, the operation is unique. The patient herself was exhibited to the Medical Society of Victoria, on the 6th July, by my friend, Dr. Syme (four months after the completion of the operation), as I felt that it was due to the profession that some responsible body of gentlemen should have an opportunity of seeing the completed result of anything designated in this Congress by so bold a title as a "novel procedure."

My reason for contributing the account of the case under Section III is that this variety of hernia is, so far as I am aware, exceedingly rare in males. I have only met with two in eighteen years. One in a man, *æt.* 44 (a hospital case), was sent down from the country as an abdominal hydatid. At the consultation the balance of opinion was in favour of hernia. There was a tense cystic tumour about midway between the ensiform cartilage and the umbilicus in the mid-line. On cutting down, I found a portion of the transverse colon, about the size of a mandarin orange, projecting through a rupture in the linea alba, so small that it had to be enlarged in order to return the gut. The opening, including the adjacent edges of the recti, were secured by a single suture of gold wire, which was left *in situ*, the superficial structures being brought into position by a few horse-hair sutures. A peculiar feature of this case was that no symptom of obstruction had ever been present, although the tumour had existed for more than a month. The man first noticed it while shearing, so that he might possibly have received an injury from a sheep whilst stooping over it. He made a perfectly good recovery.

The other (reported in the *Australasian Medical Gazette*, January, 1891) occurred in a railway employé; a young man who had overstrained himself in helping to move some empty trucks the day before he consulted me. In this case the linea alba was ruptured for a space of three inches immediately above the umbilicus, and the contents of the abdomen could be easily felt between the separated recti. I strapped the abdomen firmly and ordered him to bed for a week, but never saw anything of him again. A similar case to the one narrated in this paper occurred in the midwifery practice of Dr. Monsell, of Port Pirie, S.A., and is reported by him in the *Australasian Medical Gazette*, December, 1890, where in a young woman, *æt.* 20, in her

second labour, the linea alba ruptured from the pubes to three inches from the ensiform cartilage, the separation a fortnight afterwards being one and a half inches at the umbilicus, through which the intestines bulged out when she raised herself from the recumbent to the sitting posture. Dr. Monsell remarked that in no work on surgery or midwifery could he find a similar case to the one recorded by him. I, therefore, in the subsequent number of the same journal, narrated a case of the same kind which had occurred in the forty years' active practice of the late Dr. Dimock, of Ballarat, in which, during the fourth labour of a woman *æt.* 35, the linea alba ruptured during a pain, and the uterus protruded, allowing the limbs of the child to be distinctly made out by Drs. Dimock and Nicholson.

My patient, Mrs. W., *æt.* 36, has been married thirteen years, and has had five children. She states that she never had any illness of importance, although she had some chronic ulceration of the womb after the birth of her first child, and an attack of influenza whilst carrying her last. On the last day of August, 1891, having then entered upon the ninth month of her pregnancy, she had been washing all day, and had lifted a heavy boiler; soon after which she felt as if her back was opening and shutting, and thought that labour was setting in. During the night she had severe dry retching for four hours. Next day she noticed that the belly was very pendulous—"hanging down to her knees when in the upright position"—so that she could not walk without holding it up with both hands. In this condition she continued until her confinement, on the 26th September, 1891. She was attended by an ordinary midwife, but in consequence of the labour being tedious sent for me. The child, however, was born, and she was banded up before my arrival. The child—a puny one—vomited everything from birth, and died on the tenth day. I did not see her again until the 19th November, when she consulted me about the size of her abdomen, which she said did not appear to have diminished since her confinement. On examination I found a large ventral hernia. The linea alba had ruptured from the pubes to within $1\frac{1}{2}$ inches of the ensiform cartilage, the recti muscles being separated 8 inches by actual measurement at the widest part. When erect the intestines protruded through this huge opening, supported only by the integument, and hung down below the level of the nates, entirely obscuring the labiæ. When recumbent the intestines fell back into the abdominal cavity, but there was no approximation of the separated recti. The poor woman in consequence of the above condition of things was a continual sufferer from dragging pains in the back, loins, and abdomen, and was much troubled with irregularity of the bowels, and irritation of the bladder; in fact, her life was miserable to her, and the only respite she had was when reclining on her back.

During the course of my experience of abdominal section in the past ten years, I have been impressed by the fact observed by Hagedorn in 1884, and quoted by the President of this Congress in his able address on Laparotomy at the last Congress held in Melbourne, in January, 1889, viz., that no hernia occurs where the rectus muscle is incised, but that the cicatrix occupying the site of the linea alba often yields. Like Hagedorn, therefore, I have not attempted to keep to the exact midline in abdominal sections for some time past. And were I to hit upon the exact midline would not—if the incision exceeded two inches—be content merely with separately suturing the recti, but would first adopt the procedure which I practised with such gratifying results in this large ventral hernia, and which is so simple that it may be adopted by any surgeon accustomed to

laparotomy. The object to be attained in the repair of a rupture of this kind is manifestly twofold. First, the approximation of the separated recti; and secondly, to keep them permanently approximated.

This consideration takes us back to the normal anatomical condition before any rupture exists, *i.e.*, where the linea alba is perfect. And we then observe that the recti muscles though approximated are yet anatomically separate. Also that the principal support to the abdominal contents in the midline is afforded by the fibrous structure designated the linea alba, which consists of the sheaths of the two recti muscles united in the median line by crossing and interlacing fibres. This sheath in the upper three-fourths of the muscle is formed by the aponeuroses of the external and internal oblique and transversalis muscles, thus:—When the aponeurosis of the internal oblique reaches the outer margin of the rectus, it divides into two lamellæ, one passing in front blending with the aponeurosis of the external oblique; the other passing behind and blending with the aponeurosis of the transversalis; and these, joining at the inner border of the rectus, are inserted into the linea alba. At the lower fourth of the recti the aponeuroses of all these muscles pass in front of the rectus, and here this muscle is only separated from the peritoneum by the transversalis fascia.

Although the tendinous raphe constituting the linea alba is very strong, when once ruptured a correct approximation of its edges would be impossible, owing to their extreme thinness, consequently any mechanical method adopted to set up adhesive inflammation between them would be useless. But, as I know from personal experience, that section of either rectus was followed by firm adhesion when the cut surfaces were brought into apposition, and kept in apposition, I thought that if the muscular fibres of the two recti muscles could be approximated and fixed, the same result could be effected. On the 10th December, 1891, therefore, after cutting down in the midline, I hooked up the inner edge of the rectus on one side near the pubis, and working upwards, brought the muscle into view as far as the umbilicus. I then split up the sheath along its inner edge upon a director, and retracted the sheath to a convenient distance. The same thing was done to the opposite muscle; whilst a silver wire passed through the muscle first treated, and twisted in a loose loop, enabled me to pick it up again when wanted. The inner edges of both muscles were now freshened by lightly scoring them with the scalpel, but not so deeply as to produce any bleeding. The two muscles were then fastened firmly together by a series of interrupted silver wire sutures, half an inch apart, which included the skin, aponeurosis, and muscle. A horse-hair suture between each wire, one secured the integuments. A light dry dressing of antiseptic wool was then applied, and that portion of the abdomen operated upon was firmly supported by strips of Mead's plaster encircling the whole body. The peritoneum was accidentally wounded to the extent of half an inch, at the lower extremity of the incision, but was immediately secured with fine catgut. I did not remove any of the sutures until the fourteenth day, and then only every alternate one; but no sutures were left in after the twenty-first day. On the nineteenth day the temperature rose, and an abscess was found in the parietes 3 inches to the left of the wound. This was opened, washed out, and a drainage tube inserted, when the temperature went down, and in a week all discharge ceased.

On the 17th February, 1892, I operated in a similar manner upon that portion of the hernia above the umbilicus, and, as before, firmly strapped the abdomen over the dressings. She made an excellent recovery after this operation, the temperature never rising above 99, except once, *viz.*, on the

day after the operation. She was discharged well on the 25th March, 1892, but could have gone home a week sooner if an abdominal belt which I ordered her to wear for a time had been finished. It will be noticed that the operation was done in two sections. I decided on this course, first, because I did not know how long the operation would take, and as the patient's nervous system and bodily health were so run down by anxiety, I wished to avoid too great a shock and a long administration of the anæsthetic. Secondly, because I feared that if vomiting set in the strain on a wound from pubis almost to ensiform would be so great that some part of it might give; whilst, by leaving the upper half open, a safety valve would be provided for this contingency. She did have a good deal of vomiting and retching after the first operation, so the precaution was probably a useful one. At date of writing (August 15th) she is in good health and does all sorts of hard work about her house. The abdomen is quite firm and strong, but by my advice she still wears an abdominal belt in the day-time.

Obstetrical Palpation.—A brief note on the Position of External Abdominal Palpation in Obstetrics.

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IN 1855, Mattei defined abdominal palpation as :—"The examination of the organs contained in the abdominal cavity by methodical pressure on the external surface of the cavity." The definition now given of "Obstetrical Palpation" is that :—"It is the examination of the organs contained in the abdominal and pelvic cavities of a gravid patient, also the examination of the cavities themselves by means of the methodical use of the senses of touch and pressure on their external surfaces; aided at times by the evidence derived from the history of the patient, and the use of the external methods of examination known as inspection, percussion, mensuration, and auscultation." It is thus seen that the "palpator" takes to himself all the purely external means of investigation.

The advocates of external palpation belong to the aseptic school of Lister's disciples, they claim for their method that it is applicable to the diagnosis of almost the whole range of obstetrical conditions, from shortly after the beginning of gestation (Spencer) up to the time the uterus regains its normal dimensions after the birth of the child. It is the only method of diagnosis necessary in 95 per cent. of cases of labour, that is to say, in all those cases where no interference on the part of the attendant is necessary to complete the labour (Winckel). Vaginal examinations are regarded as unnecessary risks, which are to be avoided except in cases where interference on the part of the attendant is necessary. A knowledge of the subject is most easily acquired by the dullest intellect, and by it the common phenomena of pregnancy and labour can be diagnosed with ease by both students and nurses. The diagnosis per vaginam of presentations and positions of the fœtus in utero is often most confusing for beginners, who, unless very diligent, frequently give up the effort, remaining satisfied with the case when they have diagnosed a head presentation. Experienced practitioners frequently do the same. By palpation the diagnosis involves no complicated mental process, and, except in very rare cases, pupils of ordinary ability—unless devoid of the sense of touch—can after a very short apprenticeship make out the exact position of the child through the abdominal walls, and if called upon to deliver artificially can do so at least intelligently. (Macan.)

A review of the history of this procedure shows that it has been known from the earliest times, probably in some form is as old as the race itself. It is referred to in the Papyrus Ebers, found at Luxor (*Lancet*, 1891). Hippocrates mentions it for the correction of presentations and positions (Winckel). In the present century many writers, chiefly foreign, have referred to it, *e.g.*, Wigand, Joerg, Schmitt, Hohl, Velpeau, Mattei, Schatz, Tarnier, and Pinard. English text-books of obstetrics refer to the subject in a few lines; it is not dealt with in a systematic manner. Recently, however, a great impetus has been given to the subject by its introduction from Germany and France, &c., into several obstetrical schools in Great Britain and America, and by the systematic use of it in those places. And, as already suggested, the aseptic development of Lister's principles has caused in obstetrics a demand for such

a method of diagnosis from purely scientific reasons. Its value, therefore, which has been abundantly proved for years in Europe upon the ground of essentially practical midwifery, has recently been greatly increased.

The technique of the method is very simple, but its numerous details would involve a description too lengthy for a short paper. Amongst other important points it is necessary in every case, as a matter of routine, that the cavity of the pelvis, as well as the abdomen, be thoroughly explored, and the character of its contents investigated.

The application of palpation to ordinary obstetrical conditions is simple. It will be briefly referred to. During pregnancy the method is not without value. Dr. Herbert Spencer, of Univ. Coll., London, has been able by it to distinguish an alteration in the size and consistence of the uterus from the sixth to the eighth week (*Illustrated Medical News*, 1890). During the second half of pregnancy much more information can, obviously, be obtained. The presence of the uterus can be diagnosed without difficulty, also the presence and vitality of the foetus, and the age of the pregnancy can be estimated. In the later months, the foetal head, breech, back, small parts, and heart sounds can be discriminated, and the presentation determined.

By far the most useful application of external palpation for the practitioner, and it may be the student, the nurse, or even the patient herself, is at term, in the diagnosis of the presentations and positions of the foetus in utero. The diagnosis of the normal position (L.O.A.) will be briefly described:—After all preliminaries, the search for the foetal head is proceeded with. For this, the cavity of the pelvis is first explored and the character of its contents ascertained. If the cavity be completely full, a cephalic presentation is suspected, on the other hand, if the cavity be not filled, some abnormal presentation is to be feared. If the mass occupying the cavity present a regular, hard, spheroid surface, it must be the caput, for the breech does not exhibit these sensations, moreover the breech is afterwards discovered at another locality. There is always one part of the cephalic tumour more accessible to the palpating hands, this is the foetal forehead; in the L.O.A. and R.O.A. positions it lies posteriorly. The next part to be sought for is the breech. It is usually discovered in the fundus uteri, more often to the right of the median line, and is felt as a roundish mass not so hard nor so regular as the caput. It also possesses other characters. The third point to determine is the position and direction of the back of the foetus. This is an important matter. The back presents itself to the palpator as a more or less narrow resisting plane, situated between the foetal poles. The sensations perceived are not always the same. The fourth point to determine is the position of the foetal small parts. These are to be discovered amongst the liquor amnii, which can be felt as a resilient mass towards the side of the mother's abdomen, opposite to that in which the back was discovered. The last point to be determined is the position of the maximum intensity of the foetal heart sounds, also their rate and strength. In L.O.A. cases the heart sounds are heard through the dorsum of the foetus, and the point of maximum intensity is situated below and to the left of the mother's umbilicus. To resume, a first vertex position (L.O.A.) is diagnosed when the head is discovered in the cavity of the pelvis, and the breech in the fundus uteri, and the back is found as a curved plane in the left of the uterus and directed to the left and anteriorly, moreover, when the small parts are discovered amongst the liquor amnii on the right, and when the point of maximum intensity of the foetal heart sounds is below

and to the left of the umbilicus. Practised palpators can diagnose this variety of presentation from the position of the head, back, and foetal heart sounds, or from the position of the head and the back. The R.O.A. position and the occipito-posterior positions of the vertex are diagnosed after the same manner. Abnormal presentations, such as those of the face, breech, trunk, and their varieties, can also be determined.

After delivery the adaptations of external palpation are of great value not only in normal cases in terminating the third stage of labour but in abnormal cases where, in addition, it is also useful in the diagnosis of conditions, such as a second foetus, inertia uteri, &c. During the puerperium it is also found to be of service. Other obstetrical conditions in which the external method has been successfully applied are: The rectification of Face presentations by external means only (Schatz); the rectification of Breech presentations—External Version (Wigand); the diagnosis of Multiple pregnancies (Winckel, Playfair, &c.); the differential diagnosis of the pregnant uterus (Hohl, Spencer, &c.); Extra Uterine Pregnancies (Hohl, Tarnier, Pinard); the site of the Placenta (Spencer, Chadwick, Bagot); the Death of the Foetus (Pinard, &c.); Hydatidiform degeneration of the Chorion (Pinard, Bagot); Hydrops Amnii (Pinard); Narrowed Pelvis (Macan, Smyly); Presentation and Prolapse of Funis (Winckel, Smyly, Bagot); Hydrocephalus (Pinard, Macan, Bagot); the Progress of Labour (Hohl, Smyly, Bagot). While strongly advocating for this long known method a more rational and higher position in obstetrics than has been accorded it in our text-books and in our practice, it is not intended to underrate other valued means of diagnosis which, it is not necessary to say, should always be used in their proper sphere. A practical example of the use of external abdominal palpation in obstetrics is exhibited, amongst other places, in the work of the Rotunda Hospital, Dublin, where for the past twelve years it has been taught. In that institution every unnecessary vaginal examination is now regarded as a physical wrong done to the patient, and it is attempted to dispense with them altogether; external abdominal palpation taking their place, and being taught to both students and nurses, not only as the best means of diagnosing presentations and positions, but as a prophylaxis against sepsis.

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Some Questions affecting Obstetric Practice.

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It is surely a matter of congratulation that, although we have not yet fathomed to their full extent all the elements concerned in the causation of infectious diseases and fevers after tissue injuries, we nevertheless know quite enough to establish rules for our guidance and daily practice. In no branch is this more evident and more conducive to success than in obstetrics. In no branch has greater good been done to humanity through the marvellous progress that had its origin in the closer and more accurate investigation of diseases and its causes by truly scientific methods. In obstetrics we have gradually come to a fairly satisfactory understanding of the mechanism and processes instituted by nature and their deviations; but apart from such knowledge, we have advanced by leaps and bounds in our knowledge of the best means of protecting parturient women from the dangers that are by no means inherent to the act of parturition, but rather accidents or complications that can be entirely prevented by proper methods. I do not intend to enter into a consideration of the dangers attendant upon abnormal states of the pelvis, sexual organs, or foetus and its appendages, or abnormal general conditions, except in so far as they may be of infectious origin, *e.g.*, gonorrhœa, or may necessitate operative measures that in themselves carry some risk of infection. My aim will be to direct attention in as practical a way as possible to the methods of practice that are based upon sound scientific knowledge. It cannot be denied that in the last few years radical changes in our methods have been recommended, and often adopted only to be again discarded. What better illustration could we have than the practice of washing out the vagina before labour that was so enthusiastically advocated by almost all obstetricians, and is now given up by all except a few. What were the grounds for this innovation? It was presumed that the vagina being in continuity with the external surface of the body harboured organisms, nay more than this, dangerous pathogenic organisms. The external genitals are undoubtedly the seat of septic organisms, and it was presumed these organisms invaded the vagina. *Prima facie* clinical experience is against such a view, and *a fortiori* bacteriological investigations prove the deduction to be false. Doederlein found that the normal vaginal secretion not only did not contain septic organisms but that it soon destroyed the most dangerous of all organisms, the streptococcus pyogenes, when it is artificially introduced. The normal vaginal secretion is a strongly acid secretion and contains cheesy fragments, pavement epithelium, leucocytes, harmless bacilli, but no septic organisms. A pathological secretion is a thin purulent alkaline fluid and contains pathogenic cocci. Nevertheless, even in the pathological secretions the streptococcus is rarely found, and in any case its virulence is often modified, impaired, or lost altogether. It is a well-known fact that the virulence of the septic cocci is a variable element, and according to the virulence of the organism, rather than the condition of the soil, the nature and progress of the septic process varies. How else can we explain the sudden occurrence of one case

of severe puerperal fever followed by a rapid succession of similar cases and then a sudden cessation of these cases. The epidemic constitution depends on some inherent quality of the infectious organisms. When the virulence is moderate, the tissues may re-act to form a barrier of defence. Then there may be inflammatory changes in the wall of the uterus and around it. There may be even thrombosis of the veins, but the process remains essentially local. If the virulence be intense the tissues offer but feeble resistance, the organisms invade and spread along the lymphatics, and septic peritonitis follows, or in other cases the organisms reach the systemic veins after the disintegration of thrombi, and then cause pyæmia or septic endocarditis. Clinical experience seems to bear witness to the rarity of virulent septic organisms in the vagina. In women who have not been examined per vaginam or disinfected, though they are still exposed to infection from the external genitals, especially if there are lacerations of the perinæum, fever in child-bed is very far from common. Leopold observed but one case of fever in a series of 78, and in that case there was a hæmatoma of the labia. In a second series of 170 cases fever of short duration occurred in five, while in a total of 919 cases that had not been examined per vaginam or disinfected there occurred only 12 cases of fever that arose from the genital organs. When no internal examinations or douchings were practised, the subsequent fevers were traced to conditions quite independent of child-birth, such as syphilis, putrefying fœtus, and gonorrhœa. Such a series of fever free cases could not occur if virulent septic organisms were of common occurrence in the vagina. We have not yet exhausted the external sources of sepsis. Every now and then external circumstances of an entirely unsuspected nature are proved to be the source, especially in hospitals. Indeed the more carefully cases of sepsis are investigated, as Leopold has abundantly proved, the more certain it is that infection is introduced from the outside, that auto-infection is becoming year by year of rarer occurrence, and perhaps in a few years time will no longer be wanted to cover a multitude of sins. If then the vagina contains no dangerous organisms, not only is it unnecessary to wash out the vagina, or worse still scrub it out, but it may be highly dangerous, for in the hands of the most strict and skilful there may be an element of danger, while in the hands of the majority, who are neither careful nor skilful, the worst results may follow. The process not merely deprives the mucous membrane of its natural protection, its acid secretion, but irritates the membrane to yield an excessive and altered secretion in which dangerous organisms may lodge and grow. The statistics in Leopold's Wards seem to prove that febrile disturbances and septic complications may be actually caused by the vaginal douchings practised immediately before labour, as seen in the tables below:—

	With vaginal douchings.			Without vaginal douchings.	
	1886.	1887.	1888.	1889.	1890.
No. of births	1,387	1,388	1,369	836	1,358
Fever free cases ...	1,085	1,147	1,083	759	1,254
	(78·23%)	(82·64%)	(79·1%)	(90·8%)	(92·34%)

and in the later records the proportion of fever free cases rose to 94 per cent.

During the time anti-septic douchings of the vagina were practised, there were 2·22 per cent. of deaths from puerperal infection, while in the time when these douchings were given up the percentage of deaths from puerperal infection was only 0·14 per cent.; in other words, for every death without anti-septic douchings, there were sixteen deaths with them. We see further, that without vaginal douchings, the percentage of cases without any fever at

all during the whole puerperal period has risen from 78 to 92·34 per cent., and of the 7·66 per cent. remaining, 2·8 per cent. had only slight fever, and the women were discharged within fourteen days, while 2·65 per cent. had fever due to other conditions than sepsis. Those statistics are the more remarkable when it is further considered that there were 236 operations, including twenty operations for severe rupture of the perinæum, thirty-seven cases of forceps, twenty-six cases of turning, twenty-four craniotomies, eight Cæsarean sections, ten inductions of premature labour, and other operations. In this series too there were fourteen cases of convulsions, ten cases of placenta prævia, and 145 cases of contracted pelvis, with a conjugate diameter under 3½ inches. The complete absence of any fever in more than 94 per cent. of the cases is in complete accord with the view that the vagina does not harbour dangerous septic organisms. Again, let me repeat, that douching of the vagina before labour is a gratuitous and dangerous proceeding in cases of normal labour. Let us do nothing to disturb the satisfactory state of things that exists by nature. But what applies to douching applies with still greater force to other methods of procedure, notably operative interference and vaginal examinations. It is generally admitted that 94 per cent. of births are simple and regular. It is no mere coincidence that when no interference has occurred, either by douching or vaginal examinations, the percentage of feverless cases should approximate, and even coincide with this percentage (94 per cent.) of normal births. In other words, fever during childbirth having its origin in the genital passages is due to interference; logically speaking, interference is the single antecedent condition that determines fever in normal labour. This view then recognises that the normal process of labour does not of itself disturb the heat equilibrium, but it is a view that is only tardily accepted. Thus, Lusk writes, that under normal conditions the temperature on the third day does not rise above 100·5 F., and he attributes the rise of temperature on the fatal third and fourth days to physiological causes, and with others designates it "milk fever." Some have even gone so far as to attribute the rise of temperature to a non-suppurative form of parenchymatous inflammation—a gratuitous assumption indeed. Schroeder writes, "The absolute height of temperature is to the point 38 C. (that is 98·8 F.), or a little over. The rise begins immediately after birth, but returns to the normal in the second twelve hours. There is no mention here of a temperature of 100·5 on the third or fourth days. From my own experience, I am able to say that I have never seen a temperature above 99 F. after labour in any normal case that I have personally, and alone, attended. At the same time I have rarely attended a case that has been once examined by a midwife, or nurse, or old mother, in which fever has not occurred. Often, no doubt, but not always, the medical man introduces the infectious agent. One must especially be on one's guard against midwives, even the best of them. I warn medical men that midwives examine all cases as a routine practice. In some cases they are encouraged to do so in order to save the time of the medical attendant. I make it an absolute rule to forbid any midwife to examine a case of mine, but sometimes one has the misfortune to be sent for after the nurse or midwife. Then I disarm the one or the other by asking her what she has found. In her innocence she tells me, and I know she has examined. On several occasions I have traced the origin of fever after birth in this way. On one occasion I found out a midwife who is one of the regular assistants of a medical man in Sydney doing one of the largest practices, and not only had she examined, but she had a nasty inflammatory sore on the examining finger. My observations too, while I was at the Rotunda Hospital, prove that, in spite of examinations, cases examined with

strict aseptic and anti-septic precautions run a course quite free from fever. The records of hospitals in Germany, notably these of Leopold and Hofmeier, establish the same fact that normal labour does not at any time disturb the temperature. We may therefore take the temperature of childbed as a standard according to which we measure our success in combating the dangers of infection in child-birth. If, in a large number of cases, there is no fever, our methods are sound. If, on the other hand, there is fever, our methods are somewhere defective and responsible for the fever. Even when operative interference is necessary proper precautions will narrow down to a very small number the cases of fever following the operation, but by limiting operative interference we limit at the same time the risks of fever and infection. I am bound here to protest against the frequent use of forceps in midwifery. At the last Congress two medical men of very good reputation boasted that they used forceps about once in six cases. Now, I do not hesitate to say that in the light of modern knowledge this frequent use should be strongly discountenanced, especially for the sake of the young practitioner. Not only is it the universal experience of the best men that forceps operations increase the risk of infection to the mother, but the pressure on the foetal head may cause permanent injury to the child. The following statistics indicate the frequency of forceps operations in Leopold's wards:—

	1886.	1887.	1888.	1889.	1890.
Birth	1,387	1,388	1,369	1,276	1,358
Forceps	52	27	26	31	37
Turning	35	33	31	32	26
Cæsarean section	10	5	8	8	8
Craniotomy	7	16	19	16	24

We see that forceps were used in about one case in forty. It is therefore time that some voice should be raised in protest against such an unjustifiable and dangerous interference as is represented by the use of forceps once in every six cases. In my own experience, and from observations at the Rotunda, I should say that forceps are called for about as often as once in thirty or forty cases. Further, I wish to add that the indications for the use of forceps are not dependent only on the duration of the second stage of labour, but are determined rather by the state of the patient and of the child. Apart from complications, that imperatively indicate the use of forceps or other methods, forceps are rarely necessary till the pulse and temperature of the mother or the foetal sounds indicate disturbances. Not long ago I had a primipara, who was in labour for nearly sixty hours. She implored interference, and the nurse, I believe, prompted her. I steadily refused. The child was born, and the mother recovered without a bad symptom. She was up within ten days, and her temperature was never higher than 98·8. Would the mother and child have been as well if I had gratified the wishes of the patient, who was getting weary of the long labour? A lacerated perinæum was at least probable, and this certainly increases the area of injured tissue and the danger of infection. As a matter of fact the pains had never been very strong, and the membranes did not rupture till a few hours before the child was born. By resorting as seldom as possible to the use of forceps we avoid the risk of introducing infection and frequent lacerations of the perinæum. There can be no doubt, too, that such operations are liable to do harm to the child, breaking its bones, injuring its face, and perhaps even its brain. Disapproving of vaginal douching before labour, or after it, and of the frequent use of forceps, I desire now to say something of the commonest of all practices, vaginal examination. Such examination is by no means free

from objections, even when the most scrupulous cleanliness is adopted, and in the majority of cases introduces a considerable element of danger. Ten years ago, even five years ago, vaginal or internal examination was the chief, often the only, method of examination. Abdominal palpation or external examination was but little if at all taught or practised, and there were but vague ideas of the nature of puerperal fever, and no very useful suggestions for its prevention. Now all is changed, at least in well arranged institutions. As in surgical practice, so in obstetrics we have arrived at a correct estimate of our methods by following carefully the teachings of science. At times our steps have been slow, at times we have wandered, and had to retrace our steps, but day by day experience and experiment are assisting us to make our methods of practice more certain and perfect. By mere association of circumstances we had drifted into the idea that child-bearing was a morbid process, and needed the presence and skill of a doctor or nurse to aid it. Happily we are fast drifting back to the right view—that child-bearing is a natural process, and nature needs no doctor or nurse—needs only time to perform her work in the most satisfactory and artistic fashion. However much the woman in labour may deserve true sympathy from the world for her sufferings, these sufferings are only a prelude to the supreme moment in a woman's life, and the supreme function can and should take its course unhindered and unaided. This should be the first golden principle to guide us in our management of labour, and its full meaning should be laid to heart by all, especially the young practitioner about to enter practice. It may be left to midwives to pretend and boast that their business is to assist the woman in her function. The young practitioner who has just left the labour wards is too apt to consider that the practice in the labour ward is to be carried into private practice. In the labour wards the student has to learn much, often at the expense of the patient. In the labour wards internal examination stands in the fore front as a routine practice, and the student comes to think that it is as necessary to make a vaginal examination of a woman about to be confined as to feel the pulse or look at the tongue of an ordinary patient. I admit that five years ago a vaginal examination was presumed to be the first duty of the visiting physician. Now-a-days it is held by the highest authorities to be unnecessary in the great majority of cases, and in itself dangerous, and, therefore, to be avoided. The records of lying-in institutions have taught us much, but nothing more emphatically than that puerperal fever increased *pari-passu* with internal examinations. Instead of auto-infection, internal examinations are now proved to be the frequent source of septic conditions. Certainly anti-septic measures have been introduced into hospitals to limit this evil, and with very great success; but though these precautions are scrupulously taken in well-managed institutions, how often is the practitioner as careful in his private practice, as he was compelled by rules to be in the hospital. Let me insist here upon the importance of recognising that an internal examination, even one, is not a necessity in ordinary cases of private practice. Let us remember that when we approach a woman in labour she is free from dangerous organisms. If we rush to examine her internally we may be making haste at the same time to introduce septic organisms and with them infection. Let us fairly consider in what the necessity for an internal examination consists. The midwife, of course, thinks it the privilege of her class, and in this country, where midwives get no training to speak of, they do an immense amount of mischief. In my experience if a midwife has examined, fever follows labour almost as a natural consequence. If only midwives could be prevailed upon to keep their fingers out of the

vagina many an unfortunate woman would be spared pain and ill-health, and even death. The midwives are, for the most part, ignorant, clumsy, and dirty, and, boring about the vagina, more often than not cause slight injuries to the cervix, or vaginal wall, and, at the same time, infect. And, after all, when they have examined, or indeed, when we have examined internally, do we become possessed of any very valuable information? Do we learn anything that we cannot learn just as well by the absolutely harmless method of external examination—abdominal palpation. These are the important questions that demand an answer. I do not hesitate to assert that in the vast majority of normal labours we can learn all we want to know by the external method, and we do wrong to the patient by exposing her to greater risks of infection if we make a routine practice of examining internally. I take up this position myself, and would urge it upon this section, if only we may gradually place some reasonable restriction upon the practice in vogue. The young practitioner is naturally anxious to have good records. Let him assimilate his practice to the practice of the great teachers of Europe and he will not fail to have the same favourable results. But it must be assumed that the practitioner has been well trained in the external method. By this method it is an easy matter to determine the position of the child and its parts, the condition of the uterus, and its action, sometimes even the position of the cord, and of the placenta when it is situated on the anterior wall of the uterus. It may be even possible to diagnose placenta prævia, or occipito-posterior positions. During the time I was at the Rotunda I gave much attention to the external method, and was astonished at the accuracy of the diagnosis at which one could arrive; indeed, I have satisfied myself that an internal examination is by no means so satisfactory as an external examination. By the external method, that includes external measurements, one can tell the relation between the mother and child, and one can judge the character of the pains and the progress of the case; one can easily diagnose twins, and the presentation. Diagnosing breech presentations, one can turn the child by simple manipulation. There may be some slight risk of a presentation of the cord in such cases, and then one may make one vaginal examination after turning to be quite sure that the cord is all right. This practice of turning is surely good, as it diminishes the risk of laceration in the cervix or perinæum in the woman, and immensely improves the chances of life for the child. Further, one can determine readily by the external method whether the head is engaged in the pelvis, and as this is the state of things found in the vast majority of cases, where is the value or object of any further examinations per vaginam? If the head is well engaged there must be a simple vertex presentation; the only complication possible is presentation of the cord. This is so rare, occurring about once in three or four hundred cases, that we should scarcely be justified in urging the internal method on the score of this rare complication. Besides, when there is presentation of the cord, an examination of the foetal heart sounds gives the surest signs. If any great disturbance of the sounds is observed after a good pain, and especially if the membranes are ruptured, and it is conjectured that the cord has prolapsed, an examination per vaginam is, of course, necessary. As a subsidiary method the internal method is invaluable in complications, especially cord complications, but the internal method should take rank, not as the first method or as a necessary indispensable method in simple cases, but as a method in simple cases unnecessary and even dangerous, even though in complicated cases it has the highest value as a subsidiary method. If this be accepted there is no justification

for the frequent examinations per vaginam that are every day practised in a routine fashion, and it is a great pity we have not the opportunity of enforcing abstention from such examinations upon midwives. There is nevertheless a duty resting upon those who teach our students midwifery practice, and it seems to me to be a plain duty resting with those who draw up our regulations to see that students should be required not merely to personally conduct so many cases of midwifery, but also to furnish a report upon, say, fifty cases of pregnancy examined by the external method. Further, it should be part of the examination in midwifery that students should be required to examine and give an opinion upon a case of pregnancy based upon a thorough examination by the external method alone. Then we should have some guarantee that the students had been properly trained in the best and chief method of examination, and the internal method would fall into disuse in ordinary cases of private practice. The time occupied in furnishing such reports as I have indicated would not encroach upon the time allotted to the subject, but instead of students waiting about for their turn to come, they would be employing their time to great advantage. It goes without saying that until students and practitioners are well trained and skilful in the external method, the internal method will be universally practised; but, without doubt, when once the external method has been properly mastered, the internal method will fall into abeyance, and take a secondary place. When this satisfactory state of things is brought about, we may bid fair to be on one of the high roads to records in midwifery practice, of which we may well be proud. In any case, there is nothing to justify more than two examinations per vaginam at the most—one at the time of the first visit, and one after rupture of the membranes. It could indeed be wished that those who cannot carry through an ordinary case of labour without a vaginal examination, would make the examination at least a week before the birth is expected to take place. Nevertheless, the internal method should not fall into entire disuse, it is still a valuable subsidiary method in difficult or complicated cases. When it is necessary, no pains should be spared in freeing it as far as possible from all risk of infection. How are we to reduce to a minimum this risk? There is a practical unanimity of opinion that the external genitals should be thoroughly cleansed by washing well with soap and hot water for about ten minutes. The cleansing of the external genitals is sufficient, and should be done in all cases, especially at the time when the head is about to be born, and immediately before every internal examination. Moreover, bacteriological investigations show that the use of oily substances for lubricating the examining finger is dangerous, and the practice is rightly given up. After washing the external genitals carefully, it is well to swab them with some non-irritating anti-septic, such as creolin or lysol, but the washing is of far greater importance than the anti-septic lotions. This attention to scrupulous cleanliness of the external genitals reduces the risk of infection in the event of an internal examination, and in other cases diminishes the risk of infection when laceration of the perinæum has occurred. Needless to say, the examining hand and finger should be cleansed strictly, according to anti-septic principles, and no oily substance should be used. One may add that the same care is to be observed if a catheter has to be passed. A glass catheter should be rendered sterile, and then, after cleansing of the genitals, passed into the urethra, not under the bed-clothes, but with the guidance of the eye. No detail should be spared that helps to diminish the risk of infection. The rules thus set forth are extremely simple, for the busy practitioner is less likely to follow strictly the more complicated methods of

disinfection. We have outlived the time when disinfection involved a choice of so many highly-recommended solutions, and the physician had to spend much of his time in bustling about the room. Simplicity has displaced unnecessary refinements and complicated methods, and peace and quiet reign around the woman about to bring forth, instead of the bustle and hurry-scurry inseparable from an attitude of "Vielbeschaeftigkeit." So much for the cleanliness of the patient. There is still something to be said of the need for cleanliness in the attendant physician and the disinfection of instruments. It is but a corollary of the doctrine of objective asepsis that the physician should be in such a condition that he cannot convey infection from himself to the woman. Such personal cleanliness is to be carried out in the same way as in surgical practice, and in the event of operative procedures all instruments should be thoroughly sterilized. No physician should touch the genital passages of a parturient woman until he has thoroughly sterilized his hands, and, in cases of turning, his arms as well. No case is so urgent as to make this personal cleanliness of secondary importance. For thorough cleansing, Leopold holds that the hands should be scrubbed with a nail-brush and soap in hot water for eight to ten minutes, and afterwards dipped into perchloride (1 in 1,000) lotion, or lysol ($\frac{1}{2}$ per cent.), or carbolic acid (1 in 20). This method is simpler than Fuerbringer's, and more practicable in obstetrics, and is the method *par excellence* that should be strictly enforced among midwives. Little need be added to that which is elsewhere recommended in surgical practice for the sterilization of instruments, needles, and sutures. All should be sterilized. For instruments, boiling water is a means always at hand, but the ideal solution is a boiling solution of 1 per cent. soda. This is much more rapid than plain water. Lacerations should always be sewn up immediately with sterilized gut by the continuous suture. Every physician should also have by him sterilized cotton wool and gauze. Gauze is invaluable, especially iodoform gauze, for nothing is better in extreme cases of hæmorrhage than plugging with iodoform gauze, and nothing more important than that the gauze should be sterile. Cotton wool and gauze are readily sterilized in Koch's steam sterilizer in an hour and a half, and may then be kept in readiness in a special apparatus [*exhibited*].

One word, in conclusion, upon the treatment of puerperal fever that may appear in anyone's practice so long as ignorant midwives have much to do with puerperal women, and medical men rest content with practices in vogue ten or twenty years ago. I am, in a sense, forced to allude to this treatment by the experience I have lately had at the hands of a medical man. Puerperal fever is due to the invasion of the vaginal tract or endometrium by the streptococcus. It may be that the organism has no great virulence, and the process then remains more or less local. It may be that the organisms have already reached the lymphatics, and are spreading along them. What is to be the treatment? Certainly, as soon as fever shows itself, and has the characters of septic fever, the uterus should be well douched, but how, and with what fluids, and how often? In the case in which I was called in consultation, the patient had had the fever several days, the evening temperature varying from 104 to 105. The treatment adopted was intra-uterine douchings of 3 per cent. carbolic acid every six hours, with the smallest Boezemann and a Higginson's syringe. I disapproved of the Higginson; I disapproved of the carbolic acid; I disapproved of the smallest Boezemann; I disapproved injections every six hours; and recommended one good intra-uterine douching with sterilized water by means of a large Boezemann or glass intra-uterine catheter, once and for all, after which the uterus was to be left alone. This is the approved practice in all modern lying-in institutions. Give one good

intra-uterine douches of sterilized water as soon as fever shows itself, and another on the next evening if the temperature be still high, but after that no more. Every precaution is still to be taken to prevent further infection, and how in the world can this be done satisfactorily with a Higginson that has been already used for heaven knows what? If this treatment fails to do good one must have recourse to general measures—febrifuges, among which quinine and anti-pyrine have a good reputation, and, in extreme cases, full doses of alcohol. As a student of bacteriology and a student of obstetrics, I assert that we shall do a great service to humanity, and limit very considerably the terrible results of ignorance, if we pay homage to sound science by bringing our every-day practice more and more into harmony with its teachings.

Note on Protracted Gestation

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IN a recent number of the *British Medical Journal*, Dr. Jardine recorded a case of protracted gestation caused by occlusion of the *os externum*. In this case gestation was prolonged to 304 days. Now, as 300 days is the extreme limit recognised by law in some countries, it is extremely important, medico-legally, that it should be widely known that this limit may be much exceeded. Several well authenticated instances have been recorded in which the limit has been exceeded; but, notwithstanding this, doubt still appears to prevail in the minds of many. I thought, therefore, that the cases I wish to refer to would prove interesting. It is well known that the period of gestation varies considerably in cows and mares and other animals. M'Clintock remarks that "when there is such variability in regard to this function among lower animals, it is only to be expected that the same, or even greater irregularity should occur in the human subjects." Various reasons have been given as to why gestation should be prolonged. One author attributes it to "habits of life, feebleuess of body, and the various affections of the mind." Another "to the age of the parents, that the younger the parents, the shorter the duration of pregnancy, and *vice versâ*." The duration of the menstrual interval is considered by others to be the reason. Hydramnios also is mentioned as a cause, and I should say a much more likely one than the others referred to. In Dr. Jardine's case occlusion of the *os* was the cause, and the knife had to be used to divide the obstruction, and after much difficulty a dead child was extracted. In none of the cases I have been able to refer to, have I seen inertia of the uterus mentioned as a cause of protracted gestation. I believe this is probably the commonest cause of all.

Inertia of the uterus is a condition that accoucheurs are very familiar with. It is often the sole cause of tedious labours, and is best treated by the application of the forceps. The inertia, however, may be more complete than is generally the case, and although there may be an attempt at labour at the ninth month, the feeble uterus, after a few ineffectual efforts, gives up the struggle for the time, and gestation may be prolonged for a further period. It is not unreasonable to suppose that a number of women, who may have suffered from sub-involution after one confinement, should suffer from inertia in the next, and probably as a result of the inertia, have prolonged gestation. Involution has been described as "a physiological process, not a disease," and it has been likened to the condition known as fatty degeneration of heart. I have noticed that tedious labours, and prolonged pregnancies are more frequent in women who are fat, and deficient generally in muscular tone.

I have had several cases in my practice in which gestation was prolonged beyond the expected time, but until lately I was inclined to put them all down to carelessness on the part of the patient in making her calculations. Louger experience, however, has convinced me that pregnancy may last in some instances for ten or eleven months. Dr. Meigs, of Philadelphia,

believes it might continue for a year or even more. I am inclined to think that there are three degrees of uterine inertia—the first causing tedious labours, the second protracted gestation, and the third possibly resulting in missed labours.

The two cases I wish to bring before you this evening both occurred in the same patient. Her first confinement was natural in every way. In her second pregnancy she reckoned from the 25th January, 1890, which was the day on which her last menstruation ceased. She quickened on the 25th May, and expected to be confined early in November. About this time an attempt at labour took place, but the symptoms soon passed off, and my patient continued to pass over seven weeks in a condition of the greatest possible discomfort and distress, every day expecting to be delivered. It was not until the 21st December that her child was born, a period of 330 days since her last menstruation. The child, a boy, was an enormous one—the largest I have ever seen—and the delivery was effected with great difficulty by instruments.

In this lady's third confinement the dates are:—Menstruation ceased on the 3rd August, 1891; quickening took place on 26th December, and confinement expected middle of May, 1892. As had happened in the previous pregnancy, an attempt at labour, which soon passed off, occurred at the expected time. I visited her occasionally during the following weeks, and at last her suffering was so great I decided to induce labour on the 4th of June. To effect this I gave ergot until the following day, when I found that the pains were coming on very slowly. My patient now, dreading that she should suffer longer, begged of me to give her chloroform, and end her troubles. I did so, and after a short time completed the delivery by turning. The child was very large, though smaller than the former one. Gestation in this case had lasted 298 days, and I have no doubt would have continued longer if I had not interfered. I may mention that there can be no question as to the accuracy of the dates in these two cases. Also that the lady's husband had been away from home for more than two months on both occasions after the cessation of the menses.

These two cases, the first one especially, must be considered unusually prolonged. My patient suffered so much discomfort and misery during the last few weeks of both pregnancies, that should she become *enceinte* again I shall have no hesitation in inducing labour at the end of the ninth month if it does not come on of itself. I believe this would be the wisest course to adopt in all such cases, if we are sure of the dates. If allowed to go on, as in the first case more particularly, the woman suffers a martyrdom, and the child runs a risk of being still-born, as it continues to grow in utero.

I shall be glad to hear the opinion of others as to uterine inertia being the most probable cause of protracted gestation. The whole subject is a very important one, especially medico-legally. For instance, it would be a great injustice to consider a child illegitimate who was unfortunate enough to be the offspring of a mother, whose only fault was that she was the victim of inertia of the uterus.

A case of two Small Abscesses in the Right Ovary, producing Symptoms leading to a Diagnosis of early Ectopic Gestation.

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December 11, 1891; married, *æt.* 41. Three months before the birth of her youngest child, eighteen months ago, she had contracted gonorrhœa. Was very feverish, had severe pain in abdomen after confinement, and did not get about till the baby was two months old; suckled for five months. Menstruation reappeared six months after birth of child, and has been regular since; is always accompanied by severe pain in lower part of abdomen. Menstruated three weeks ago; flow lasted a week, then became profuse again, and was accompanied by the passage of "pieces of skin." There was very severe throbbing pain in right pelvic region, and if she stood up this became much worse and made her feel faint and sick. On vaginal examination there was found a very tender pulsating tumour to the right of and behind the uterus. Under chloroform this swelling could be more clearly made out, and vessels could be felt actively pulsating at every point of it which could be reached. It was roughly globular, not smooth, and about the size of a hen's egg. It moved with the uterus, but was distinct from it, and bulged out more posteriorly than the uterus. The os was open, the cervix and body of uterus were fairly central, but somewhat pushed forward, and to the left. The sound passed $2\frac{1}{2}$ inches. Left ovary was a little enlarged. Per rectum the swelling seemed smooth and more distinct from uterus, and pulsation was not so distinctly felt.

December 17th.—Abdominal section. The tumour was found to consist of the right ovary, which was adherent on all sides. The adhesions were easily broken down but bled freely. The ovary with the tube adherent to it was removed, as was also the left ovary and tube, which was also diseased, and bound down by adhesions. No drainage was used. She made a good recovery, and lost all symptoms.

REMARKS.

I venture to bring this case before the notice of this section, the more especially as having recently had some experience in the diagnosis of early ectopic gestations, having sent to the British Gynæcological Society last year, notes of five cases with four specimens, I felt fully convinced, even after I found the tumour was an ovary and not a tube, that I was dealing with a case of ectopic gestation. On opening the ovary it was evident that the symptoms were produced by the two small abscesses in the ovarian substance, though she presented most of the symptoms which go towards building up a diagnosis of ectopic gestation, including passage of decidua, metrorrhagia accompanied by severe pelvic pains, more agonising than she had ever previously experienced, the presence of an extremely tender, tense, tumour on one side, and behind body of uterus, somewhat pushing the uterus forward and to the other side, and, what to my mind was most characteristic of all the symptoms, the active pulsation at every point of the tumour which

could be reached by the finger per vaginam. This pulsation which I had noticed in all the cases of early ectopic gestation I had seen, was very different from the pulsation which I have noticed in connection with inflammatory and other diseases of the appendages. In the latter the pulsation could generally be felt only in the course of the uterine artery in the roof of the vagina, but in this, and the ectopic cases, vessels could be felt pulsating not only in the roof of the vagina but at every point of the tumour which could be reached by the finger. This case shows that the diagnosis of early ectopic gestation, though it can generally be made before rupture if attention is called to the symptoms, is yet open in the present state of our knowledge to a liability of error, which in this case would have entailed serious consequences if the faradic treatment of early ectopic gestations, so strongly advocated by many American gynaecologists, had been adopted. From personal experience I am decidedly in favour of treating early ectopic gestation by abdominal section and excision of the cyst, and consequently the error in diagnosis did not militate against the welfare of this patient.

Notes on (a.) Ectopic Fœtus of the 5th month removed by Abdominal Section. (b.) Ectopic Fœtus past full term removed by Abdominal Section during a Superadded Normal Pregnancy.

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It will perhaps facilitate discussion if I premise my account of these cases by a short statement of my views upon the pathology of ectopic gestation. Shortly they are as follows:—All ectopic gestations are at first tubal. There is no such thing as a primary ovarian or abdominal pregnancy. The cause is probably a catarrhal condition of the tube, which destroys the ciliated epithelium, and allows impregnation to take place there. The enlargement of the tube which follows cannot keep pace with that of the ovum, and rupture takes place some time before the twelfth week. The point of rupture is determined by the attachment of the placenta. If through the upper portion of the tube into the peritoneal cavity, death takes place sooner or later, often with startling suddenness, because there is nothing to restrain the hæmorrhage, but if downwards between the layers of the broad ligament, the distension soon reaches its limit, and the pressure stops the bleeding. One of several things may then happen. The ovum may die at once, and with the blood become gradually absorbed, as in the case of extra-peritoneal hæmatocoele from other cause, or death may not take place for weeks, or months, or until the full period of gestation has been reached. After death the fœtus may become mummified, or become converted into a lithopædion, or into the substance called adipocere, which is an ammoniacal soap, or may undergo decomposition, and give rise to an abscess. At any time there may be a secondary rupture of the sac, which is the broad ligament, into the general peritoneal cavity, followed by the speedy death of the patient. Whatever happens—unless when primary rupture takes place very early, downwards into the broad ligament, and is followed by the death and absorption of the ovum—the position of the unfortunate woman is full of peril as long as she has imprisoned within her this misplaced product of conception. Slight illness or injury may at any time set up suppuration in or cause rupture of the sac. The treatment, in my opinion, should be—with the one exception mentioned above—abdominal section, directly the condition is discovered, whatever be the stage of pregnancy, and whether the child be alive or dead. If the child be dead, the cord should be cut short, the placenta left, and the cavity tamponed with iodoform gauze, after its edges have been stitched to the parietal opening. If the child be alive, the cavity should be irrigated and hermetically closed, in the manner to be described, so that if symptoms of decomposition arise, it may be reopened, and the placenta removed.

The first specimen which I show you is that of an ectopic fœtus, at about the fifth month. The salient points in connection with the case are as follows:—A. H. *æt.* 21, married twelve months. Two months after marriage menses ceased for six months. During this time she suffered from depression of mind, pains in the lower abdomen, back, and legs, and the abdomen and

breasts enlarged. The flow then—that is, eight months after marriage and four before I saw her—appeared profusely, and accompanied by pain, so sudden and sovere as to cause profound collapse. Two doctors who were called in, diagnosed peritonitis, and said they heard the foetal heart. Vomiting began in twelve hours, and an offensive piece of flesh was expelled from the vagina in a few days. For three weeks she was in a dangerous condition, and has not been strong since. The menses have reappeared regularly, but in excessive quantity and with much pain. The enlargement of abdomen and breasts has greatly diminished since the peritonitis. There is still slight occasional pain in the abdomen. She often feels cold, but there are no shivers or sweats. She looks pale, worn, and thin. P. 100 weak. T. normal; tongue coated. The lower abdomen is occupied by a somewhat hard slightly tender, unmovable tumour, reaching to within 1 inch from umbilicus, and laterally extending from ant. sup. iliac spine on right, to 1 inch beyond middle line on left. Per vaginam the uterus is pushed up and to left, and is only slightly enlarged. The left ovary is prolapsed, and the base of the tumour occupies the R. and post. fornices. Per rectum the broadened curved edge of the R. Br. Lig. is felt partially encircling bowel. An incision was made over most prominent part of tumour, about $1\frac{1}{2}$ inch to R. of middle line. The parietal peritoneum was closely adherent to the sac, and the latter so moulded to the foetus that it was thought to be the child's skin. The two were separated to some extent before the mistake was discovered. On incising the sac some purulent looking, but odourless fluid escaped. The foetus was easily extracted, and the cord cut short. Part of the placenta, about the size of the palm of the hand, appeared dead and was cut away, but on attempting to separate the remaining and much larger portion, free hemorrhage occurred, so it was left. A small tear in lower part of the sac was carefully sewn up from the inside. The sac cavity was then irrigated and tamponed with iodoform gauze, and its margins stitched into parietal opening. A glass drainage-tube was inserted into peritoneal cavity, above the sac. The foetus, as you see, although shrunk is free from any sign of decomposition. The patient made an easy recovery. The sac cavity rapidly closed in, and filled up with granulations, which covered over the portions of placenta which had been left. None of this came away. Immediately on returning home she became pregnant again, this time normally. The consequent distension burst open the recently closed sinus, and the placenta was gradually forced out to about the size of a small saucer towards the end of pregnancy. She was confined, eleven months after the operation, of a living child, and had an uneventful puerperium. The tension being relieved, the old sac quickly healed up. The points of greatest interest in the case are:—1. That the ectopic gestation occurred immediately after marriage without any history of previous salpingitis. 2. That the primary rupture of the tube downwards into the broad ligament passed unnoticed by the patient. I look upon the attack of severe pain followed by peritonitis at the sixth month as a small secondary rupture of the broad ligament sac into the peritoneum. 3. That the major part of the placenta did not slough, and is still retained without detriment to the patient.

The second case, "Ectopic foetus past full term removed by abdominal section during a super-added normal pregnancy," is published in the *British Gynaecological Journal* for May, 1891. In this case the whole placenta is still retained, and the woman has passed through another normal pregnancy easily.

These two cases, with two published in the transactions of the second Inter-colonial Medical Congress, make four in which I have removed an ectopic foetus by abdominal section. All the patients are now alive and well.

On Dilatation and Curetting of the Uterus.

J. A. G. HAMILTON, M.B., (Univ., Dublin), L.R.C.S., Edin.

I SHALL confine my remarks on the above subject to the use of the Dilator and Curette in the common forms of uterine disease, *i.e.*, chronic endometritis and recurrent hæmorrhage. It is only of late years, it has been shown, that the practice of dilating the uterus and thoroughly exploring its interior can be practised with safety. Formerly dilatation used to be effected with prepared sponge or laminaria tents, subsequently the method of dilating the cervix rapidly by means of graduated bougies was taught; and I think most of the gynæcologists of the present day agree that it is a method admirably suited to most cases; with rigid antiseptic precautions there is practically no danger, and very rarely any subsequent pyrexia, but, in my opinion there are not a few cases in which rapid dilatation by one of the many expanding dilators, or by graduated bougies, is not only a difficult but a dangerous proceeding. If the patient has had a number of children, or be one in which the cervical canal is patulous, or if, from imperfect involution subsequent to labour or abortion, the cervix is soft and dilatable, rapid dilatation, with say Hegar's dilator, can be with ease and safety practised; but in women who have never conceived, or in whom after a long course of ergot the cervix is rigid, it should not, in my opinion, be attempted without previously softening and relaxing the tissues of the cervix by the introduction of a laminaria tent, for ten or twelve hours; after the withdrawal of the tent the os will be found so softened and relaxed that generally speaking a No. 8 or No. 9 Hegar's will pass the os internum readily. If the patient has a soft and relaxed cervix, or if she has recently been delivered or aborted, the use of laminaria tent is unnecessary, and dilatation by means of Hegar's dilator can be easily effected without any preparations further than the thorough disinfection of the vagina and uterus. Once you dilate up to No. 10 or 12 Hegar's, it is frequently surprising how the muscular resistance appears to lessen and you can rapidly dilate up to No. 20 or possibly No. 29; the larger numbers are rarely necessary. I think in all cases of profuse menorrhagia, without obvious cause, the cavity of the uterus should be explored by rapidly dilating the cervix with graduated bougies under an anæsthetic. Where uterine fibroids are present or suspected the cavity should be explored, before removal of the appendages or hysterectomy is entertained. No doubt many cases of hæmorrhage, continuing after the removal of the appendages are caused by small pedunculated fibroids, or fungous endometritis, and might have been relieved if the cavity had been previously dilated and explored with the finger. Here let me point out the importance, in all cases of hæmorrhage, of dilating the uterus sufficiently to allow of its cavity being thoroughly explored with the finger. I am firmly convinced that cases of obscure hæmorrhage are in the main caused by small unrecognisable fibroids, the finger in the cavity of the uterus is the only exact means of diagnosis we possess; probably in catarrhal endometritis this may not be necessary, it may suffice to dilate enough to allow the introduction of a fair sized curette, but in all cases of obscure hæmorrhage or mucopurulent discharge, I consider it absolutely necessary to be able to explore the cavity with your finger; a case which recently occurred in the practice of my colleague, Dr. Way, and myself, has impressed this on my mind.

Mrs. D., *æt.* 45; married eleven years; one child; no miscarriages; menses always profuse; about four and a half years ago became very profuse; lasted so for about two years when Dr. Way dilated the uterine cavity and removed some cervical polypi; improved for about six months, when menses became as profuse as ever; last period lasted six weeks; had taken large quantities of ergot off and on for years; to be dilated and curetted. June 23rd: Under ether the uterus was dilated, but was so rigid it was impossible to dilate it further than No. 12, Hegar's, even a Sim's dilator had no effect on it; the curette was used and removed some fungous growths and a small piece of fibrous tissue; it was impossible to examine with the finger; ten days after the hæmorrhage came on again lasting fourteen days; patient very weak. July 16th: A laminaria tent was introduced; the next morning the cervix was easily dilated sufficient to allow the cavity to be explored with the index finger; a small fibroid was felt in right cornu, this was easily removed with an ovum forceps; left hospital July 30th; no return of hæmorrhage. August 20th: Patient reported herself as feeling better than she had done for years. In this case probably the condition found at the second dilation was present and might have been found at the first, had it been possible to dilate the uterus sufficiently to allow of its cavity being explored by the finger; but this was impossible, until the cervix was first relaxed by a laminaria tent. We all know that of late years tents have been condemned by many leading gynecologists as likely to produce septic poisoning; sponge tents, I have no doubt, may do so, but I fail to see how a laminaria tent, previously rendered aseptic, and left in not longer than twelve hours, can cause septic mischief, provided the vagina and uterus are thoroughly disinfected before the tent is introduced, and the uterine cavity washed out after its withdrawal. Some writers maintain that the full dilatation of the cervix is not only dangerous, but unnecessary, and that the intelligent use of the curette ought to detect the presence of polypi or small fibroids. I, myself, have never succeeded in detecting a polypus or fibroid in this way, and I maintain, if the cervix is soft and easily relaxed, there is no increase of danger by dilating sufficiently to allow the introduction of a finger. No doubt in cases of inflammation of the uterus itself or its surrounding tissues dilatation would be hazardous. In these cases a preliminary course of treatment is advisable before treating the interior of the uterus. Rest in bed, tamponing the vagina with Glycerine Boracic, or Icthyol, and frequent hot douching will frequently reduce the inflammation and thickening. Here let me record my opinion in the remarkable efficacy of Icthyol in the various inflammatory diseases connected with the uterus—such as parametritis, perimetritis, exudations, or adhesions. I have frequently found general inflammation and exudation disappear with remarkable rapidity after a few weeks tamponing the vagina with a solution of Icthyol in Glycerine, and its internal administration in pill. The use of the curette was first introduced by Recamier some forty years ago, to remove what he termed "Fungosites"; they correspond with what is now known as fungous endometritis; in spite of the obvious advantage of the curette it was not until some eight years ago it came into general use; it was at first used chiefly as a diagnostic agent, and afterwards for the removal of an unhealthy condition of mucous membrane. It was at one time considered that the mucous membrane having been thoroughly removed it would be replaced by cicatricial tissue, and that sterility would result, but it has been clearly proved by Martin, of Berlin, that uterine mucous membrane differs from any other in its rapid and complete regeneration. This was proved in a case in Martin's practice, where the uterus had been repeatedly curetted and cauterised for adenoma

of its mucous membrane, and, as a last resource, the uterus had to be removed; the last scraping having taken place two months previously, a microscopic examination of the uterus after extirpation showed that the new mucous membrane had developed in the usual way, and no trace of cicatricial tissue could be found. Theoretically, there is no reason why pregnancy should be interfered with, but, on the contrary, it should be rather favoured by the removal of a diseased membrane. In my experience the operation rather favours than hinders the occurrence of pregnancy. The use of the sharp curette in endometritis is advocated by a large number of authors. Most authors agree that it is the remedy *par excellence* for uterine hæmorrhage, especially that following abortion and for mucopurulent uterine discharges—in fact, the use of the curette has completely revolutionised the treatment of hæmorrhage or purulent discharges following abortion or delivery. Where the retained decidua is decomposing or causing hæmorrhage, and the patient is constantly on the verge of serious septic infection, I do not think this treatment is as much used as it ought to be. Undoubtedly the best results are obtained in cases of hæmorrhage, and the least satisfactory where there is tubal disease, even where this latter condition is present or suspected, dilatation and curetting are not contra-indicated, and may do good. Nearly everyone agrees that curetting itself is innocuous, provided that asepsis be maintained before, during, and after the operation. Accidents result from infection, and should be avoidable. Emmett speaks of the curette as “an instrument which has proved a most objectionable one,” and says, “he has reached a point in his practice where he avoids, if possible, the introduction of any instrument or remedy within the uterus.” But why spend months and years in the treatment of diseased membrane which can be removed in a few minutes, with the certainty of its being speedily replaced by at least as good, but probably a better one? But the use of the curette alone should not be relied on, it has to be used to a great extent by guess, so it is not only possible but probable that portions of the unhealthy membrane may escape the action of the instrument, so I almost invariably inject some substance into the uterus, a few days after curetting; if used immediately after the bleeding from the surface of the cavity is generally so free that it neutralises the action of the caustic. The injection is, I think, more satisfactory than the introduction of medicinal agents on a probe, as the whole surface of the endometrium is more thoroughly cauterised. No doubt intra-uterine injections are strongly objected to in some quarters, but I think they are safe enough, if there is a ready outflow assured by previous dilatation, and if only a small quantity is used, from ten to thirty drops; care must be taken not to introduce air, and in making choice of a fluid; it is better not to use a substance that produces a firm coagula such as solutions of iron; it has been found that iodine and iodized phenol produce scarcely any firm coagula; but a pre-requisite for the use of any intra-uterine injection is the securing of a free outlet for the fluid. I generally use a small quantity of iodine, and sometimes iodized phenol or pyroligneous acid, with a Brann’s syringe, and with requisite precautions I have never seen any untoward sequela follow their use. I have found it a good plan after injecting the fluid to introduce a probe armed with wool and swab the uterus round; by this means the fluid is brought in contact with every part of the endometrium. We often see patients who have been curetted without receiving permanent benefit therefrom, this is, I think, due to the neglect of some such after-treatment, as I have just mentioned. My mode of procedure is as follows:—The patient takes some aperient medicine on the morning or night before the operation; the bowel is thoroughly cleared out on the morning of the

operation by a copious enema ; the vagina is douched with a 1:4000 perchloride solution ; the Hegars are placed in 1:20 carbolic lotion, or 1:1000 perchloride ; all the other instruments are boiled ; an anæsthetic is given ; the patient is placed in the dorsal position, the knees being drawn up with a Clover's crutch, a duckbill or Simon's speculum is placed in the vagina, the vagina is thoroughly washed out with the 1:4000 perchloride solution ; the os is pulled down with the vulsellum ; the operator holds the vulsellum in his left hand ; by this means he can accurately determine the amount of resistance to the dilators, the cervix is rapidly dilated with Hegar's dilators ; the uterus being frequently washed out during the dilatation. When the required amount of dilatation is acquired the whole of the uterus is carefully and thoroughly scraped until the curette is heard to grate on the uterine muscle, first with a sharp curette, and then with Thomas' dullwire curette, to remove all shreds ; the uterus is thoroughly irrigated with the perchloride solution ; the vagina is swabbed out with dry wool pads, and a vaginal tampon sprinkled with iodoform is introduced. The patient is kept quiet in bed for six or seven days. I have always used Hegar's dilators and cannot speak too highly of them, after a somewhat extensive trial, but would prefer them made of solid steel or glass so that they could be boiled. I should also prefer them more bevelled at the point, and as the last four or five sizes are larger than is ever required, the graduation might be more continuous so that a No. 12 might be about equal to a No. 8 of the present series. I generally use a Simon's curette ; it is dull on one side and sharp on the other, and has the advantage of having a flexible handle, so that it is possible to give the instrument any desired curve, and on account of its shape it is very unlikely to perforate the uterus. Formerly I used a Bozeman's catheter to irrigate the uterus, but rarely use it now, as I found the inner tube frequently got blocked with blood clots, and on account of the sharpness of its point it is possible to perforate. The only case of perforation that occurred in my practice, while curetting, was caused by a Bozeman's catheter, happily without any bad result. I now use a plan of irrigating the uterus as suggested by my colleague, Dr. Way ; a piece of rubber tubing 6 or 8 inches long, perforated at the end is fixed, on the nozzle of the irrigating tube ; the end of the short tube is placed between the blades of a Sim's dilator ; the dilator is introduced into the uterus closed, and when *in situ*, the blades are opened, thus dilating the cervix, and allowing free ingress and egress for the fluid. I have always used a 1 in 4 or 5000 solution of perchloride for washing out, and have never seen any bad results follow its use. The plan of dilating or curetting in the lateral decubitus, without a speculum and without a vulsellum is, in my opinion, not only unscientific but dangerous, and only tends to bring a useful operation into disrepute.

Note on Trendelenburg's Position, with exhibition of Krug's Apparatus.

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THIS position being a comparatively recent addition to the resources of abdominal surgery, I thought members of the section might be interested in having it brought under their notice along with a portable apparatus devised by Dr. Florian Krug, of New York, by which it may easily be maintained. The principle of the position is that by placing the patient's head instead of feet to the window, and rising the pelvis to an angle of 45 degrees, gravity causes all the movable contents of the abdomen to fall down towards the diaphragm leaving the pelvis clear, and thus enabling the surgeon to bring sight as well as touch to his aid in dealing with growths having deep pelvic connections, removing diseased and adherent appendages, or in extirpating the uterus from above for myoma. Trendelenburg originally designed the position for removing stone or tumour from the bladder by supra-pubic eystotomy, in which it proved of such signal service that he and his followers, especially Dr. Krug, quickly extended its use to all pelvic operations. Bleeding points can be at once seen and secured. Ureters can be avoided, and ligatures applied in a manner which is not possible in the ordinary position. Again, syncope is much less likely to occur. In ruptured tube from ectopic gestation one would expect that the position would be especially valuable.

The disadvantages suggested by opponents are that a somewhat larger incision is necessary and that fluids, in case the cyst ruptures, may escape all over the abdominal cavity. The first is relatively of small importance, and the second can be guarded against by placing sponges over intestines, besides which rupture is less likely to occur when manipulations are carried out by sight as well as touch.

I have only just received this apparatus by the kindness of Dr. Krug, and, so far, have used it but twice, in one of which it certainly facilitated the procedures necessary to remove appendages, but a more extended trial is necessary before expressing an opinion on its merits.

Some Points bearing on Vaginal Hysterectomy, with the notes of Four Consecutive Cases.

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I PROPOSE placing before you, briefly, the notes of four cases of vaginal hysterectomy in which the operation was done after a diagnosis of carcinoma had been made. The cases are consecutive. In the first three a sufficient interval has elapsed to allow of final conclusions being drawn; the fourth was only operated upon on September 17th, 1892. As will be seen, all four recovered from the operation. My reason for drawing your attention to this subject is, that the operation of vaginal hysterectomy for carcinoma is still "sub judice." Some, especially Mr. Lawson Tait, deny that it is ever justifiable to remove a uterus for carcinoma; others follow Dr. John Williams, who believes that hysterectomy should only be done in cases of carcinoma of the *body* of the uterus, and not in those cases where the cervix is primarily involved. Others, again, think that in cases originating either in the body or cervix—provided that the growth has not extended beyond certain limits—removal of the whole uterus should be practised.

Case 1.—Mrs. I., *æt* 47. Mother of eight children; labours all normal; no family history of cancer. Menopause at 45 years. Bleeding recommenced eighteen months afterwards, was intermittent, but gradually increasing in amount, and for the month previous to operation had been continuous and accompanied by foetid discharge. V.E. Left side of cervix occupied by a soft irregular mass, bleeding readily on touch, and extending chiefly upwards into the cervical canal. Os open. Uterus movable. Broad ligaments apparently free from infiltration. Body of uterus felt rather large to bi-manual examination.

Operation on October 23rd, 1889. Patient in lithotomy position. Mucous membrane dissected off anterior part of cervix; base of bladder separated and raised with uterus; then peritoneal cavity opened anteriorly, the same being done posteriorly as regards the rectum; the fundus was retroverted; the broad ligament on right side was ligatured in halves and divided; the same was done on the left side as far as possible from the uterus. The ligatures were passed externally to the ovaries and Fallopian tubes on both sides; uterus then removed; catheter passed and a little clear urine drawn off. The small intestines were felt, but did not prolapse. The lower part of the peritoneal cavity was sponged out. No sutures were used. The vagina was loosely packed with iodoform gauze. The patient had very little pain. The temperature never rose above 99.2 F. Patient up on the fourteenth day. Sixteen months after the operation she was feeling well and strong. On examination a small nodule was felt beneath the vaginal mucous membrane, high up on the left side. Eighteen months after operation this had increased in size and involved the mucous membrane. There was slight coloured discharge. She died comatose, twenty months after the operation; having suffered very little pain at any time. Microscopic examination of the growth showed epithelial nests.

Case 2.—Mrs. W., *æt.* 45. Mother of four children. Had complained of “bearing down” pains for two years; for the last twelve months there had been almost daily loss of blood, and for the last six months the pain had been very severe. V.E. Cervix hard. Os irregular and soft, bleeding freely when touched, slight induration extending towards the left side. Uterus movable. Operation was done in the same way as in the previous case, but the ligature on the left side slipped, and the stump of the broad ligament was clamped by means of a pair of Spence’s forceps, which were left on for twenty-four hours. On opening Douglas’ pouch, a gush of blood-stained fluid escaped, and the peritoneum was found to be studded with nodules of new growth, which also involved the left ovary and Fallopian tube. The after treatment was the same as in the previous case. The pain was severe and there was some foul-smelling discharge from the vagina, due to the presence of the slough caused by the clamp which had been placed on the stump of the left broad ligament. An attack of cellulitis of the left side of the pelvis detained the patient in hospital for some weeks. She died about twelve months after the operation.

Case 3.—Mrs. H., *æt.* 40. Nine normal pregnancies. First seen April 7th, 1891. She was then five months pregnant; there was some bleeding from the uterus; no pain. With rest, viburnum and opium internally, the bleeding ceased within twenty-four hours, but returned badly on April 13th, *i.e.*, in six days, soon after patient got up. The same treatment was adopted as before, and bleeding diminished, but did not entirely cease. On April 20th, patient suddenly flooded, became blanched and almost pulseless. The cervix was dilated by the fingers and fœtus removed, also the placenta and membranes were peeled off the uterus, leaving nothing behind. After a few days’ rest in bed, with hot iodine douche and ergot internally, all bleeding ceased. The patient was up on the twelfth day, *i.e.*, May 2nd. On May 6th, sixteen days after previous flooding, she suddenly flooded again, becoming blanched and pulseless. She was placed in the lithotomy position and thoroughly curetted. At the left side of the fundus, near the opening of the left Fallopian tube, there was a soft spot from which a good deal of tissue was scraped away in pieces, and which had all the naked eye appearances of carcinoma. The uterus was plugged with sublimate gauze; after this the bleeding ceased. Portions of the tissue removed were cut and mounted, and under the microscope showed what appeared to be carcinomatous structure,—nests, cylinders, small cells, and in one piece large epithelial-looking cells in the stroma. On 5th May, the uterus was removed per vaginam, together with the ovaries and tubes. This was somewhat troublesome owing to the size of the uterus, which made it difficult to get a ligature over the top of the left broad ligament. The temperature reached 101° on the second day after the operation, then fell, was normal for some days before the patient left hospital, which she did on the 15th day, having made an uninterrupted recovery. On examining the patient fourteen months after operation she was found to be free from all signs of disease.

Case 4.—Mrs. M’N., *æt.* 35. Mother of four children, the youngest 5 years old. One miscarriage in Feb., 1890; both before and after which, menstruation was regular. In July, 1891, she had a “flooding,” the bleeding continued, more or less, for six weeks, then nothing for two months, and after that the patient was regular till July, 1892, from that time she had almost continuous bleeding. V.E.—Uterus large, about 4 inches long; cervix soft; os abnormally open, and allowing of the introduction of finger, which just touched a polypoid mass within the internal os; this felt soft and irregular in outline.

On 13th September, the cervix having been further dilated by tupelo tents, the cavity of the uterus was explored and a soft irregular polypoid mass was felt growing from the left anterior surface of the uterus, near the opening of the Fallopian tube, the base was broad, the mass was so friable that it was separated by means of the finger-nail. There was free bleeding, and therefore the cavity of the uterus was packed with a strip of sublimate gauze which was removed next morning. On microscopic examination, the mass removed showed, as was expected, the characteristics of a carcinoma. On 17th September, the uterus was removed per vaginam, together with the tubes and ovaries. On the second day the temperature rose $99^{\circ}4$, and since then has been normal. The pain was only severe during the first twelve hours.

I have recorded these cases partly because the position of the operation is not yet established, and therefore all cases should be published in order that some more definite conclusion may be arrived at as to its value in the treatment of carcinoma of the uterus, and partly because I wish to draw attention to some points of technique. First,—Is the operation justifiable? Mr. Lawson Tait says, "No," and gives as his chief reason, that "the primary mortality must always be excessively heavy." In this I believe he is mistaken, and the cases I have referred to, as far as they go, bear out this conclusion—all four having recovered from the operation—and in only one was the period of convalescence prolonged. This occurred in case No. 2, the only one in which a clamp was used. I wish to draw attention particularly to the shortness of the convalescent period, for this, taken together with the low primary mortality, seems to further justify the performance of the operation. In case No. 1 the patient was up at the end of fourteen days. In case No. 3 she was able to leave the hospital on the fifteenth day; and in case No. 4 the patient is so well that I propose to let her get up on the twelfth day. In fact the period of absolute rest necessary is shorter than that required after an abdominal section done for cystic disease of the ovary.

Do we get a better result in cases of carcinoma of the uterus by means of complete removal, or partial removal? So far as my experience goes, complete removal, when possible, is the best. Again, it is a general principle of surgery to go as wide as possible of the disease, when dealing with malignant growths; and, in the case of an organ so peculiarly placed from an anatomical point of view, *i.e.*, as regards blood supply, &c., as the uterus, it surely would seem right to remove it entirely rather than partially, more especially if further experience bears out what I have just stated with regard to the primary mortality and period of convalescence. I am quite aware that objection may be made that I have ventured to generalise on a series of cases far too small to allow definite conclusions to be drawn. Of course the next four cases may give 100 per cent. of deaths, instead of recoveries; but on the other hand, it is only fair to suppose that with increased experience, both as to methods of operation and selection of suitable cases, the results will improve. And this brings me to another point, namely, the selection of cases suitable for operation.

The earlier the case, the better the result is likely to be, and it is therefore of the utmost importance to investigate each suspicious case most thoroughly; even dilating the cervix so as to explore the cavity of the uterus, should there be no sign of growth from the cervix. No case is suitable for extirpation unless the uterus is movable antero-posteriorly, and unless it will also allow of downward traction by means of a vulsellum; in other words there must not be extensive infiltration of the broad ligaments. With regard to the method of performing the operation. There are many details which are of the

utmost importance, as, I believe, they influence the result materially. In the first place, when we do a vaginal hysterotomy, we do an abdominal section; and in abdominal sections for the removal of growths, one of the greatest advances of late years has been the intra-peritoneal method of treating the stump after it has been ligatured, as opposed to the extra-peritoneal treatment with clamps. Why should we depart from this method when removing the uterus? As bearing on this question, case No. 2, is instructive, for in this instance a clamp was used for the left broad ligament, and this is the only case in which any cellulitis occurred. Many operators are still in the habit of using clamps instead of ligatures. It certainly simplifies the operation and renders it easier of performance, but it means that there is necessarily an extensive slough formed lying in communication with the peritoneal cavity; and in almost all cases accompanied by a foul smelling discharge—a condition which predisposes to peritonitis and cellulitis; and I feel sure that this is responsible for many of the fatal results, besides which it is almost impossible to remove the ovaries and Fallopian tubes with the uterus when clamps are used. In fact, you cannot go so far away from the seat of disease when using clamps as when using ligatures; and bearing in mind the close connection between the vascular and lymphatic supply of the uterus, and of the ovaries and Fallopian tubes, it seems more in accord with surgical principles to remove them with uterus than to leave them behind, because they may be already affected with carcinomatous elements, and also because they are no longer functionally useful. I should therefore strongly advocate the ligaturing of the broad ligaments in sections, external to the ovaries and Fallopian tubes, using two or three ligatures for each side; these should be cut short so as to allow of the intraperitoneal treatment of the stump. In connection with this, it is worthy of note that the largest blood-vessels divided will be found in the middle and upper thirds of the broad ligaments and not in the lower third.

In descriptions of the operation usually given the operator is advised, after entering the peritoneal cavity in front and behind, to retrovert the uterus, bringing the fundus down through the posterior aperture; this does not seem to me to be always either helpful or necessary, more especially if the uterus is large, say over 3 inches long. Another point which is worthy of attention, is to make anterior and posterior flaps long. By this means more complete apposition is obtained, and the peritoneal cavity is efficiently shut off from the vagina. No sutures are necessary; I have not seen any tendency to prolapse of either intestines or omentum. No drainage tube is needed, as, of course, all blood-clots will have been removed from the peritoneal cavity, and the vagina rendered aseptic.

With regard to the relative mortality of vaginal hysterotomy, as I have described it, and supra-vaginal amputation of the cervix, I have not been able to compare statistics, but my impression is that it will rather be in favour of complete removal of the whole organ, than in favour of supra-vaginal amputation, chiefly because of the lessened liability to cellulitis and septic infection in the former as compared with the latter operation. Another argument in favour of complete removal as compared with partial removal, is that, given a case of recurrence after complete removal of the uterus, the secondary growth extends more inwards than downwards into the vagina, and the patient is therefore, to a certain extent, spared the exhausting hæmorrhage and foetid discharge which always accompanies the latter stages of this distressing condition.

Notes on a Specimen of Intra-Peritoneal Rupture of Extra-Uterine Fœtation, treated by Laparotomy.

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THIS is a specimen I obtained by operation from a lady, *æt.* 25, who had been married three months. I first saw her on October 16th, 1891, when I diagnosed rupture of the right Fallopian tube. I removed this on the 17th, the fœtus being about $2\frac{1}{2}$ months, washing out an enormous quantity of clotted blood from the pelvis and general abdominal cavity. The patient rallied well, but peritonitis developed, and she died on the fifth day. I injected intra-venously $2\frac{1}{2}$ pints of normal saline solution (3i of sodium chloride to Oi of distilled water), with marked improvement on the fourth day. On several occasions I washed out her stomach for "black vomit" with great benefit. Contrary to Tait's theory—she had not been sterile for some years before her trouble began.

SECTION OF PUBLIC HEALTH.

President's Address.

H. T. WHITTELL, M.D., Aber., M.R.C.S., Eng.

President Central Board of Health, S.A., Hon. Consulting Surgeon, Adelaide Hospital.

AT the first Intercolonial Medical Congress of Australasia, which was held in Adelaide five years ago, it was my privilege to act as chairman of the section of State Medicine, and on the last day of the Congress to deliver an address on the leading subjects that had been brought under notice during our sittings. On that occasion my appointment was due to some untoward event which prevented a gentleman from one of the neighbouring colonies complying with the invitation of the Adelaide committee to take charge of the section. Having enjoyed the honour of presiding in Adelaide, I was not a little surprised when I received a request from your executive committee to undertake the same duty here. I was disposed to think that the committee had made a mistake, because to my knowledge there were many members who were more eligible and better qualified for the position. I have, however, learned that obedience to properly constituted authority is one of society's first laws, and for this reason I complied with the invitation of the committee, although strongly inclined to canvass the prudence of its choice.

In casting about for a subject, it occurred to me that our time might be usefully spent in a discussion of a practical nature, in which both the profession and the outside world might feel an interest. I, therefore, invite your attention to the health laws in Australia, and to their mode of administration, with a view to determine how far they are adapted to Australian requirements, and what changes are necessary in order to secure all the benefits which legislation on subjects relating to public health can afford.

A rapid notice of the laws and methods of administration in Europe, and particularly in England, will prepare the way to a study of Australian legislation, which has been chiefly copied from that of the mother country. In Europe two different systems are more or less in favour. In the first there are two elements, separate and distinct; a deliberative element, and an executive element; a council to give advice, and a board of officers which, if it approve the advice, may give to it practical effect. The recommendations of the council, even of the highest, are not necessarily obligatory on the executive. It is in France that this system finds most approval. There we find councils of health of districts, councils of departments, and a general council, all the members of which are supposed to be experts, ready to advise when called on by the prefects or other heads of the administrative departments. The system adapts itself to the bureaucratic notions of the country, but observers who have studied it in operation report that the so-called

councils of the smaller districts really do nothing, and that the advice of the higher councils is frequently ignored altogether, or acted on after delays which prevent the full realisation of its benefits. In the second system there is an attempt to combine deliberative judgment with a quasi-judicial and an administrative authority. Boards are formed by Government nomination, by election, or by a combination of the two, and to those boards powers are given by legal enactment to enforce the general requirements of public hygiene; to make special regulations for special conditions; and to bring offenders against these laws or regulations before legal tribunals, with a view to the infliction of penalties for neglect or disobedience. This is the system which has been adopted in our mother country. We find there a Local Government Board, with a semi-political organisation. Its president is appointed by Her Majesty, and it numbers amongst its members Her Majesty's principal Secretaries of State and other eminent Government officials. It has a wide range of authority, including, amongst subjects in which we are interested, the examination of schemes for water supply and drainage, the supervision of vaccination, and a general oversight of the local boards throughout the country which act under the authority of the Public Health Acts. These local boards have jurisdiction in their respective districts, and consist in boroughs of the town council; in towns not corporate, of the commissioners; and in rural districts, of the guardians of the unions. All the members are elected, and I am sorry to say that the election is governed more by party politics or parochial economics than by the fitness of the candidate for duties connected with the preservation of the public health.

To prevent mischief arising from local neglect, the Local Government Board has authority to inquire into the action of local boards; and, if satisfied that any board has made default in enforcing the provisions of the Health Acts, it may make orders which, if not obeyed, may be enforced by mandamus, or by the appointment of someone to do what has been ordered, at the expense of the board in default. We shall not be able to examine the details of this system in actual work. Much has been accomplished by it, but later on I shall bring some facts under your notice which lead to the conclusion that it is not effecting all that could be desired.

The Health Acts of most of our Australian Colonies are modelled, with some modifications, on the pattern of English legislation. It is the aim in all Australian enactments to provide for local administration, supervised to a greater or less extent by a central authority. There are, however, differences in methods, which are worth consideration. For purposes of comparison we may examine the health laws of the three colonies—New South Wales, South Australia, and Victoria. I select these because they bring out the differences to which I have referred.

In New South Wales we find the anomaly of a Board of Health without any special Health Act to prescribe its duties or to define its authority. It was called into existence in 1881, for the purpose of carrying out the provisions of the Infectious Disease Supervision Act—an Act which, I believe, has reference to smallpox only. From official communications which occasionally reach us in Adelaide, I believe that the quarantine laws, although nominally in charge of a Minister of the Crown, are administered by this board. In 1886, under the Dairies Supervision Act, another duty was entrusted to the board—a supervision of the regulations in respect of the production and distribution of milk. Anyone studying this Act will find that it was a distinct advance on the laws affecting dairies in any of the sister colonies. There is in it a promise of great practical utility, but I regret to find that the power entrusted to the Board of Health is supervision

only, the working of the Act being in the hands of local authorities. During the present year the board has been granted the further power to deal with diseased animals and meat unfit for food. It has authority to inspect cattle, to seize meat, to punish offenders who sell diseased animals, and to obtain orders from the justices to destroy any animal affected with anthrax, actinomycosis, cancer, tuberculosis, or any other disease proclaimed by the Governor to be a disease within the meaning and for the purposes of the Act. Why the justices are brought in to determine whether the opinion of skilled officers of the board be correct I must leave others to explain. In the administration of this Act the board has direct power without reference to local authorities. Except in the particulars referred to, the administration of such sanitary laws as are in force in New South Wales is entirely under the control of local authorities, without any right of supervision on the part of the Board of Health. These authorities have the general powers usually conferred on municipalities with respect to roads, sewers, water supply, lighting, and the like; and they have further powers under the Nuisances Prevention Act, passed in 1875. With one exception, this Act dealt only with privies and the removal of nightsoil. The exception is a clause giving to the municipalities power to fill up, remove, alter, or otherwise deal with any existing well which shall be adjudged to be injurious to health—a clause which the framers of more recent Health Acts would have done well to copy. Under this Act the local authorities had power to make by-laws in reference to the disposal of excreta and to appoint an inspector. In case of failure, the Governor may make regulations and appointments, which are to be held as binding, as if made by the local councils.

It will be seen that the distinguishing characteristic of sanitary law in New South Wales is local administration; a sort of "go as you please" on the part of the Municipal Councils, with no practical control by any central authority. The Board of Health is utilised by the Government as a board of investigation and advice, but, like the Health Councils in France, it has, with the exceptions named, no authority to enforce its decisions.

Turning to the larger but less populated colony of South Australia, permit me to remind you that in the address I delivered to the Congress in Adelaide I stated that some important changes in sanitary administration had been recently introduced, on the effects of which I could not then offer an opinion. An experiment was going on which it would be well to watch. Between the years 1873 and 1887 the Health Acts, copied with some improvements from the English Acts were in nearly all parts of the Colony under the direct administration of a central board, nominated by the Government, and stationed in Adelaide. The only places excepted were the incorporated towns, numbering thirty-eight in all; which were under the jurisdiction of their respective councils. The colony is large, and in most parts sparsely populated. The area under the thirty-eight local boards was about 213 square miles; that under the direct jurisdiction of the central board may be taken roughly at about 903,000 square miles. The board consists of a president and four other members, all appointed and paid by the Government, each member holding office during pleasure. In addition to some compulsory powers over the thirty-eight local boards which were difficult to enforce, this board had authority to carry out the provisions of the Health Act throughout the whole of the vast territory under its jurisdiction. This was exercised with the assistance of one chief travelling inspector and of the police, many of whom were appointed inspectors under the Act, and all of whom, thanks to the hearty co-operation of a willing Commissioner, were required to report forthwith to the board the outbreak of any infectious disease and the exist-

ence of all insanitary conditions that came under their notice in the localities where they were stationed. There is in some quarters a disposition to disparage the work of the police, but after a prolonged experience of the diligence, watchfulness, and willingness with which the orders of the central board were carried out without any extra remuneration, I should be wanting in duty if I failed to bring under your notice this efficient organisation which the Governments of Australia have readily formed at their hands for assisting central boards in enforcing the requirements of sanitary legislation. Under the régime of which I am now speaking the central board in Adelaide had in the police a small army of inspectors at its disposal. If anything went wrong in any part of the colony a telegram or letter brought the information to the board, and by the same means directions were forwarded to the officer on the spot to take such action as the board might deem necessary. The process was simple, speedy, and in most cases effective. The efficiency was in part due to a clause in our Health Act which is not enacted in the same terms in the Acts of other countries, but which is worth more than a passing notice. The wording of the clause is such as to constitute the board the sole judge of what is a nuisance under the Act, and to give the board the fullest powers to make such orders as it might think fit in reference thereto. Those of our number who, as officers of health, have had experience in cases before Justices of the Peace, will remember that whenever an information for nuisance is before the Bench witnesses can always be brought to testify that the thing complained of is no nuisance whatever—"agreeable rather than offensive," and "conducive to health rather than injurious." On the strength of such testimony the offender is not infrequently discharged, because the Bench is unable to judge between conflicting testimony; and the benefit of the doubt is given to the accused. The wording of the clause in the South Australian Act prevented this miscarriage. It was ruled in our lower courts, and finally confirmed on appeal to our Supreme Court, that if the central board be satisfied that a nuisance exists or has existed, the justices cannot look behind the decision of the board, but must enforce the board's orders without any inquiry into the facts which have led to their being given. The issue before the justices, therefore, was not whether a nuisance existed but whether the board's order had been disobeyed. In 1887 it was the pleasure of the Government, following, I believe, the example of Victoria, to extend the principles of local self-government to nearly the whole of South Australia proper. Except where there were corporate towns the colony was divided into district councils, some of which include hundreds of miles of territory. The government of these districts was entrusted to members of council elected in their respective localities. The councils have authority over roads, drains, bridges, and the like, and, in addition, every council was declared to be a local board of health for the administration of the Health Acts then in force. The central board was deprived of its direct authority, but was retained as a board of supervision. The number of local boards was thus increased from 38 to 173, each of which is expected to maintain a separate staff of officers, and to bear all the costs of sanitary administration without, except in corporate towns, having authority to levy a single farthing for a health rate to cover the expenditure. The central board has a nominal power to compel these local boards to carry out their duties, but the legal obstacles in the way of enforcing this power are such that it is difficult to bring it into operation.

Turning to Victoria we find that several tentative measures have been adopted between the years 1865 and 1889. The Act of 1889, although an amending Act, introduces a new constitution and a new mode of administra-

tion, which, though yet on their trial, are worthy of thoughtful attention. The leading principle of the Victorian Act is that there shall be a central board of public health and also separate local boards composed of the members of council for the time being of each city or district into which Victoria is divided for the purposes of local government. The Board of Public Health has a president, a chief medical inspector, each appointed by the Government, and seven members elected by the local boards from candidates who have been already elected as members of the local councils. The power of the central board to enforce the making of by-laws by local boards and the performance of other duties is similar to, though somewhat greater than, that usually given in Health Acts to a central authority, and the method of enforcing such power is much on the same lines. There is, further, in the Victorian Act, a provision by which at any moment the central board may, by a stroke of the pen, be deprived of its authority, and even the local boards may become mere machines for carrying out the will of any political party which may happen to be in the ascendant. By the fifth clause of the Act of 1889 all the powers, rights, and authorities vested in the Board of Public Health shall, whenever he deems fit, be exercisable by the Minister, and when so exercised shall, if so ordered by the Minister, supersede any act, direction, notice, or order of the board, and every officer is to obey the orders of such Minister as if such orders had been given by the board. Clause 15 of the same Act gives power to the Minister, whenever he thinks it desirable, to order the central board or any local board to make any regulations or by-laws for the purposes of the Act, and if the order be not complied with the Governor-in-Council may make such by-laws or regulations, which forthwith have the same force as if made by the defaulting board. It will be seen that we have under our notice four different systems of health-law administration: 1st. That of a purely local administration, as seen in New South Wales. 2nd. That of a central administration by a board having direct authority to act, except in a few corporate towns, in all parts of the colony, as seen in South Australia previous to 1887. 3rd. That of local administration with some degree of supervision by a central board, as now seen in South Australia; and 4th, that of a similar arrangement, with power on the part of the Minister to supersede boards and to take authority into his own hands, as seen in Victoria. I dismiss the Victorian innovation with the remark that, while I see no great necessity for it, I am not prepared to offer any serious objection. At the worst, there need be small apprehension that if a board be doing its work effectively any Minister would be permitted to interfere with it. On the other hand, I can imagine laxity on the part of boards against which the power in the hands of a Minister might serve as a protection. Leaving this an open question, we are free to discuss whether the system of local administration, which we have copied from the English model, is adapted to present requirements in Australia. For the moment we may leave out of consideration the large towns, such as Sydney, Melbourne, Adelaide, and Ballarat—where, if anywhere, local boards may be tolerably effective—and look to our districts in which, as is usual in Australia, there are a few small townships scattered about in a large but sparsely populated area. I am in agreement with the advocates for the extension to local authorities of power to manage local affairs. We may concede that district boards manage business of a parochial character better, cheaper, and more satisfactorily than it would be managed by a central authority. But there is a limit to this. There are some undertakings which are beyond the limits of local action, and which concern the people generally almost as much as they do the inhabitants of a given locality. Take, for example, the preservation of

the public peace. We are not ready in Australia to copy the English system. We prefer a national police to town constables; and many close observers have the same preference with respect to the more important and more difficult duty of preserving the public health. Without underrating the ability of a local council for the work which properly belongs to it, we cannot close our eyes to the fact that the gentlemen constituting these councils—the local butcher, the baker, the publican, the farmer, and others—are never elected because of their knowledge of sanitation, but because of their supposed fitness for getting their roads, bridges, water-channels, and similar objects attended to at the cheapest rate. If the gentleman on the local council knows the dodges of Australian politics, how to squeeze the parliamentary representative, to induce him, when votes are wanted, to squeeze the Government to squeeze the national treasurer to pay for something in the district which the people there ought to pay for themselves, his position is firm; but if by chance a sanitarian be elected the moment he begins to talk about spending money for health purposes he becomes, as a rule, a marked man, certain to be displaced at the next election by an opponent whose views of economy do not include the fad of sanitary improvements. My experience of local boards in Australia has been that, speaking generally, the public health is left to take care of itself—a happy-go-lucky system on which no reliance could be placed. What occurs is something like this:—The chief inspector from the central board visits a locality, and after inspection points out numerous insanitary conditions which require the attention of the local board. The board arouses itself to some degree of activity, notices are served, work is done, and the sanitary condition of the district is improved. The activity soon ends, and when after a year or so the inspector pays another visit to the district he finds a new crop of insanitary conditions which have been allowed to grow since the date of his last inspection. Nothing has been learned from the past, and little can be hoped for in the future. There are exceptions to this, but they are few and far between. Nor is this to be wondered at. Few of the local boards have an officer of health, or if there be one his salary is so small that he would be starved out if he gave more than the rag end of his time to his duties. Frequently, too, there is no sanitary inspector for hundreds of miles of territory, or the duty of sanitary inspector, secretary to the Board of Health, and secretary to the district council is entrusted to one man whose salary is so small that if it were not for what he earns at the more profitable employment of tailor, shoemaker, gardener, or similar occupations, he would be unable to keep out of debt.

It may be objected that in most Health Acts power is given to central boards to compel the local boards to action, either by mandamus from the law courts or by taking over certain work after due notice, and doing it at the expense of the board in default. At first this would appear to meet the case, but when we begin to apply the remedy we soon learn what is the meaning of "the law's delays," and if the local board be obstinate it can throw obstacles in the way which postpone the work until it is too late to be of material benefit. This is probably the reason why the central authorities seldom bring their powers into operation. There is something wrong somewhere, either in the law or in its administration. The grip of the central authorities is not sufficient to secure local efficiency. Even in England, which is far in advance of Australia in sanitation, where the people are educated up to a higher standard and millions sterling have been expended in sanitary improvements, it is easy to find evidence that the Local Government Board, with all its powers, is unable to cope with local neglect. If you will turn to the last two reports of the medical officer of the board you

will find, in the reports of the medical inspectors who had been sent to different towns to inquire into the outbreak of infectious diseases, or to ascertain the mode of administration of the law by local boards, that in fifty-eight inquiries, undertaken during the two years, it was reported that in at least fifty of them the local authorities had been lamentably defective in their work. Foul water channels, contaminated water supplies, disgusting privies, defective drainage, neglect of scavenging, overcrowding, and a failure to enforce the removal of open nuisances, are the burden of complaint, and the chronicle of the deaths that ensued from this neglect is the witness that even in our mother land the best system of local sanitary government has not yet been attained. Is it different here? I am a stranger and a guest in New South Wales, but I trust you will pardon me for saying that what I have seen in former visits to some of your inland towns was sufficient to convince me that your system of sanitary government might be changed with advantage. I have a reminiscence of a journey I took some time ago from Kiama to a little town near the Shoalhaven River. On the way the gentleman who was driving me asked, with a twinkle in his eye, "Do you smell anything?" There was no need for the question; my handkerchief was already at my nose, and when I asked, "What's the meaning of this?" my companion said, "Oh, it's only a butter factory we are coming to; we shall pass others as we go along, but you will always smell them before you see them. It's the pigs, you know; the pigs and the butter always go together." When I asked about the action of the central board, which I understood had special control over dairies, I was told that the stink did not reach as far as Sydney; the people there only got the butter. My observations elsewhere taught me that there were other things of which the Sydney Board had no knowledge, or, having the knowledge, they lacked the power to amend. If time allowed I might remind you of abominations created or connived at by the boards whose duty it was to prevent them. You will not forget the nuisance created by your Glebe Council by the mooring of a boat to receive and store nightsoil close to a public wharf, or the difficulties which your Board of Health and your Minister of State had to overcome in their attempt to compel the Council—the appointed guardians of the public health—to abate it. Neither will you have forgotten the outbreak of typhoid fever just outside Sydney in 1889, which was shown by your Chief Medical Inspector, Dr. Thompson, to have been due largely to the gross neglect, I had almost said the assistance of, the Councils of the Municipalities of Newtown and Macdonaldtown. I might further illustrate the deficiencies of your local government by reference to the past and present condition of your township at Broken Hill, where, if I am to believe the reports which reach Adelaide, the local authorities fail utterly in keeping the place decently clean.

I do not wish to say much about Victoria. The central board in its last report writes with some degree of satisfaction about the willingness of local boards to discharge their duties, but admits that there is room for improvement. It would be unkind, in the face of the difficulties in and around Melbourne, and in view of the enormous outlay lately determined on for removing them, to say all that might be said about Melbourne and the surrounding districts under the care of local authorities, but as evidence that local boards are no more efficient in Victoria than they are in other colonies, I refer you to some interesting reading, to be found in the Melbourne press of some two years ago, in reference to an outbreak of diphtheria at Elsternwick—some six miles from Melbourne—which was due to the inability or unwillingness of the local authority to deal with the insanitary

conditions discovered by the Government Inspector. The people who were responsible for these conditions justified themselves with the same excuses as we are accustomed to hear and expect in Adelaide: "The reports were exaggerations; things were not so bad as represented; and, therefore, neither the officers nor Council were deserving of censure!"

I could go on quoting other illustrations till your patience would be exhausted, but let these suffice.

It will probably occur to you that it is easier to pull down than to build. It is reasonable to inquire what system of sanitary administration can be devised which would give greater promise of success. My aim this morning has been rather in the direction of diagnosis than of treatment. A perfect system had not yet come to light. We must be content to wait, to watch, to fail, and to improve. Whatever laws are enacted; the three chief requirements of administration are efficiency, promptitude, and economy. After some years of Australian experience I venture to suggest that these can be obtained only through a central authority untrammelled, and with a power of direction over local boards equal at least to that which your military commander or the head of your police has over the forces under his control. Whether that authority shall be a nominated or an elected board or a Minister of Health is a minor question. What I claim is that however constituted it must have in itself or its officers knowledge and training to deal with every subject in relation to public health. In the early days of boards of health their functions seemed to begin and end in the removal and prevention of nuisances. We see this idea running through all the earlier Health Acts, and doubtless the compulsory removal of filth from the midst of communities must always be a duty never to be relaxed. In these later times more than this is demanded. Boards are required with members who, while not losing sight of nuisance abatement, have a knowledge of sanitation as a science and can advise on every subject, included in public hygiene; members who have made a special study of the etiology of disease, not forgetting bacteriology, which gives promise of shedding a light on the nature of infection which, but yesterday, we looked for in vain. For this work we require gentlemen of high standing in their respective departments, and once secured they must be trusted. I use that word trusted advisedly, for if a board cannot be trusted it is better that it be not appointed. In Australia there is a tendency to ignore our central boards. Victoria, as you are aware, has lately entered on a gigantic scheme of sewerage for greater Melbourne, which is to cost some seven or eight millions. The money will be well spent if the scheme succeed, and its success will depend on the capabilities of those who have to carry it out. Instead of giving the Board of Public Health some voice in the management, the Government entrusted the whole control of this scheme, and also of the water supply, to a Metropolitan Board of Works. When the bill was under consideration the President of the Health Board reported that if it passed it would follow in regard to half the population of the colony that the most important works in connection with sanitation would be removed from the control or supervision of the Board of Health; and he made a series of suggestions, every one of which it would have been to the interests of Victoria to adopt. These were disregarded, and as the law now stands the health board may inspect the plans for sewers before tenders be called, and may have the privilege of appearing before the Board of Public Works to make suggestions in reference to them, which the Board of Works may reject or adopt at its pleasure. We see the same tendency in South Australia, where the Central Board of Health has no direct control over either the Adelaide watershed or the sewers. Some four years ago an additional water supply was required for Adelaide,

and suburbs. Political feeling became mixed up with the question of locality, and a commission was appointed to determine which was the best of several schemes proposed. No gentleman on that commission would make pretension to a knowledge of even the elements of sanitary science. A mass of evidence was taken, but the boards of health (central and local) were ignored, not even the chief inspector, who knew every foot of the districts, was called as a witness. I believe Providence guided the commission to a good engineering scheme, but with respect to the quality of the water a quotation from the report will show the chance work to which we have been exposed. The commissioners reported that the water of the Onkaparinga River, whence it proposed to draw the supply, has been proved by analysis to be of a high standard of purity. The analyses are published in the Schedule. There are three, all much alike, and I place one of them before you without comment:—

Specific gravity ...	...	...	...	...	...	...	1,000·38.
Reaction ...	...	...	...	...	...	...	Alkaline.
Taste ...	...	...	...	...	...	...	Fresh.
Total solid matter per gallon ...	...	...	...	...	...	...	0·07 oz.
Sodium and potassium chlorides ...	...	...	...	...	...	...	20·41
Magnesium sulphate ...	...	...	...	...	...	...	1·31
Magnesium carbonate ...	...	...	...	...	...	...	3·63
Calcium carbonate ...	...	...	...	...	...	...	4·60

} Grains per
gallon.

Next to efficiency comes the important factor, promptitude in action. It is in reference to this that I find so much that is objectionable in our present administration. There is too much red tape in our modes of proceeding. The inspector must wait for the health officer. The health officer must report to the secretary. The secretary must wait for a meeting of his board. The board must wait till the expiry of its notice to an offender. If the notice be disregarded, there must be further delay to bring into requisition the powers of the magistrates. Magistrates are not always impressed with the importance of sanitation, and grant adjournments, or, at best, if they decide in favour of the board, there is an appeal from them to the higher courts. If, as sometimes happens, the local boards decline to take trouble, or to incur the necessary expense, the passive resistance is such that months may be lost before effective work can be undertaken. While lawyers have been wrangling lives have been in danger, or, it may be, fell diseases, which in their early developments could have been easily arrested, have gained such a footing as to become for a time irresistible. Rely on it, the best work of a board of health is not done while a panic brings its action into prominence. It is constant steady watchfulness, with promptitude in dealing with the causes of disease, which is the true test of its efficiency.

I shall say little in reference to economical working. The cheapest is not always the most economical. A few years ago New South Wales spent more than £100,000 in stamping out smallpox in Sydney and suburbs. It was a costly business, but it was successful, and I doubt if there is a single taxpayer in this great colony who will not agree that never in your history was money better expended. Sanitary work is always costly, and it is perhaps for this reason that local boards so frequently shirk their duties. While preparing my address, I happened to pick up a copy of our South Australian *Government Gazette*. I found in it the balance-sheets for last year of seventeen district councils—the local boards of health for their districts. The combined area under their jurisdiction is about 47,000 square miles; the total income for the year was within a few pounds of £11,000; the total expenditure for sanitary purposes over this vast area is set down as less than £80. Even in our advanced city of Adelaide there is reason for complaint. Some years ago, before the completion of our deep drainage works, I was

instructed by my board to undertake an examination into the sanitary condition of Adelaide. Many parts were reeking with filth. When the town clerk gave evidence, I questioned him about the small rate voted for health purposes; the answer was significant, "Pressure," he said, "is brought by the ratepayers on the council to reduce the rate to the very lowest amount. This is done by private solicitations, and at public meetings during election times." If the facts I have brought under notice are of any importance, they point to the conclusion that the administration of the Health Acts by local boards in Australia is liable to become weak, inactive, and untrusty. If the qualifications for boards of health are such as I have mentioned, there is no hiding the fact that members of local boards must, as a rule, be incapable, the funds at their disposal are insufficient, and local influences too often outweigh their sense of public duty. I maintain that the public health is too sacred a charge to be entrusted to such control. I am dissident about suggesting a remedy. Finding the local boards in existence, I am not prepared to advocate their abolition. We must take them for what they are worth. It would, perhaps, be advisable to leave them with their present power if they choose to use it, but we must not trust to them. In every emergency they will fail us. I suggest that the central authority, carefully appointed, shall be armed with the fullest powers to deal with sanitary matters in any part of the community, and that it shall have, at least, a concurrent jurisdiction with the local boards, so that without let or hindrance, and without delay, it may bring its force to bear wherever conditions exist which, in its judgment, are prejudicial. In dealing with nuisances injurious to health, or with outbreaks of epidemic diseases, its will should be law. When a fire has to be put out, the fire-brigade must have free action. It may be asked, who is to bear the cost? Let the politician, who will not deny that public health is a primary consideration, answer the question. Let him bear in mind that work that is worth doing is worth paying for, and that whether the local council or the State be the paymaster, the money comes from the same source—the pocket of the taxpayer. I believe that the policy of central administration is by far the more economical. I am convinced that in South Australia, with one or two medical and sanitary inspectors, and the aid of the police, the central board could do ten times more work than is now done by the 173 local boards, and this at a tithe of the cost each local board would have to pay if it had a competent and separate staff of officers. There will always be some impatience of taxation, but there would be no difficulty in showing that money spent in sanitary reforms is the best investment in which the funds of a country can be employed. It has proved so in England, and we have found it true in Australia. One might be tempted to say, in these days of exploded booms, bank failures, and blank returns, sanitation is the only thing that yields a good and certain interest for our investments.

I am conscious that we have but skimmed the surface of the subject I proposed to discuss, but I must forbear. If I have succeeded in attracting your attention to the defects of our present system, my object has been attained. We belong to a profession which has been foremost in the van of sanitary reform. We see, alas, daily the results of neglect. We would ever keep before the world that adage of our fathers, "prevention is better than cure." I have confidence that better systems than those now in force will be devised. It is to you, gentlemen, that, in the search for improved methods, sanitarians must look for help. The past gives them confidence that in the days to come they will not look in vain for your generous sympathy and cordial co-operation.

Notes on certain "Worm Nests" or "Worm Knots" occurring in the Cellular Tissue of the Brisket in Cattle.

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IN the beginning of this year Mr. Stanley, our able and industrious Government Veterinarian, forwarded for examination to the Board of Health, Sydney, specimens which he labelled "Tumours from the brisket of a fat bullock, containing filaria-ova viviparous." These specimens were sent to the writer for examination and report; and, through the courtesy of the Health Department, Sydney, he has not only been permitted to make free use of these specimens, but he has been supplied with abundant material both for naked eye and microscopic examination.

"Worm nests," or "worm knots," as they are sometimes named, may be described as consisting of sexually mature parasitic worms, with their ova and embryos in various stages of development, and with or without the presence of more or less embryonic or fully-formed fibrous tissue, the result of the irritation produced by the parasites. According to Leuckart, "worm nests" are often met with in the lungs of mammals, especially of sheep, oxen, and rabbits, sometimes in such profusion that inflammation sets in, and soon kills the animal. Actual worm epidemics are sometimes caused in this way. (See "*Parasites*," p. 47.)

To the family of the strongylidæ belong many of the parasites which form these "worm nests." Thus, in cattle, we have the strongylus micrurus, or lung worm, which is occasionally so very fatal to young calves, causing in them a parasitic bronchitis termed "husk," or "hoose"; and in sheep the strongylus filaria attacks especially the young lambs. But some species of filaria also form "worm nests," as in a case of Ecker, mentioned by Leuckart, in which a tumour, as large as a pea, was found in a rook, which tumour contained a full-grown filaria attenuata and a mass of its eggs. Again, the filaria sanguinolenta, so common in the dogs of warm climates, is found in the aorta and œsophagus massed together in large numbers, with ova and embryos in different stages of development. Filaria immitis is also very common in the hearts of our domestic dogs. "Worm nests," containing very many nematodes belonging to the species spiroptera megastoma, have been described as tumours from 20 to 40 m.m. in size, occurring between the mucous and muscular layers of the stomach of horses. These tumours were perforated by several holes, which traversed the mucous membrane of the stomach, and they possessed a reticulated structure, with numerous intercommunicating cavities. In the human subject the occurrence of "worm nests" must be of comparatively rare occurrence. It is important to remember that all these cases of "worm nests" are caused by members of the great order, nematoda, or round worms.

GENERAL CHARACTERS.

Turning now to the "worm nests" occurring chiefly in the briskets of cattle, we find that they are of very common occurrence. Mr. Stanley informs me that they are to be found in at least 50 per cent. of the animals slaughtered in Sydney, and information derived from other sources fully confirms this statement. Constable Gregor, acting-inspector at Mr. Ben. Richards' slaughter works, Riverstone—a very intelligent and careful officer—has given considerable attention to this subject. He states that in animals under four years of age it is very rare to find any of these "worm nests," and that they are also rare in the Hereford breed of cattle, or "bauldies," as they are commonly called. In cattle bred in Queensland they are very common. They may frequently be felt as firm tumours underneath the skin of the brisket during the life of the animal, as their most common site is in the fatty tissue immediately beneath the skin; but they may also be found after death between the muscular layers and on the rump. I have been told by butchers that, in extremely rare cases, they have been so numerous and so widely distributed over the whole body that it has been necessary, on that account, to condemn the carcase. Usually, however, they vary from one "nest" to twenty or more in one brisket. The butchers speak of them as "white kernels," or "kernels," and they have a tradition that these contain a little worm, thus differing from ordinary lymphatic glands, which are also called "kernels." They regard them as quite harmless, but as detracting from the good appearance of the meat; and so they cut away those on the surface partly because of appearances, and partly in the case of salted meat, because they are supposed "not to take up the salt."

NAKED EYE APPEARANCES.

They vary considerably, both in size and shape, from about the size of a pea, up to masses, having a long diameter of three inches or more. The smaller ones are rounded in shape, but there is a great tendency to flattening as they increase in size. They are imbedded in the fatty tissue, to which they are so closely adherent as to render their removal difficult, except by cutting portions of the surrounding fat away with them. Indeed, they cannot be "shelled out" of their position like an enlarged gland or ordinary fibrous tumour. They occur singly, or two or more may be joined together by imperfect adhesions. Often, on the surface of some of the larger "worm-nests" a swollen, varicose-looking vessel may be seen; and blood-vessels of considerable size may be observed entering the capsule of the "nest." When pressed by the finger they are firm and somewhat elastic to the touch. On section, the knife cuts through a tough, fibrous structure. Usually, a small amount of clear or slightly blood-stained serous-looking fluid escapes as the incision is being made. The cut surface is of a pale greyish-white colour, with here and there spots of pink in some specimens. Careful examination, even with the naked eye, enables one easily to distinguish an external fibrous capsule, varying very considerably in thickness according to the size of the "worm-nest"—the larger the nest the thicker the capsule. Within this capsule are contents of a delicate thread-like structure, which, on gentle manipulation with a pin or needle, is seen to consist of minute yellowish or whitish threads—the adult worms. These worms are not merely coiled up within the fibrous capsule; because very careful attempts at extraction have hitherto failed to remove complete specimens. Only comparatively small portions can in this way be removed on account of the breaking of the worm, thus proving the intimate connection existing between the worm and the capsule, which connection will be at once apparent on microscopic examination of properly prepared sections.

MICROSCOPIC STRUCTURE.

Taking a medium-sized "nest" for convenience of description, we find, under a low power, the external fibrous capsule surrounding the tumour, the outer margin of which is somewhat ragged and uneven, having been cut away from the neighbouring parts. Passing from the inner margin of this capsule towards the centre of the "nest" are numerous trabeculæ, of varying thicknesses, which interlace to form a meshwork enclosing spaces, of different shapes and sizes, which communicate freely with each other. These spaces are mostly empty in specimens cut in the ordinary way on a freezing microtome; but in sections cut in celloidin they are occupied by the parent worm cut in various directions. Under a high power the capsule is seen to be composed of dense fibrous tissue in some places, and of fibro-cellular tissue in others. It is very abundantly supplied with blood-vessels, some of which are comparatively large and fully developed, whilst very many are small and embryonic in character. Surrounding many of the blood-vessels are dense masses of small round cells which sometimes appear as rounded nodules, closely resembling immature tubercle nodules, at other times as rows of small cells along the course of a vessel cut longitudinally. Nematode embryos, in considerable numbers, are present in some parts of this capsule, some bent double, others coiled up in figure-of-eight fashion, and others stretched full length. The greater number of these embryos occupied the lymphatic spaces; but occasionally one appeared to lie in the channel of a blood-vessel ready to be carried along the general circulation. The trabeculæ are somewhat more cellular than the capsule; and the blood-vessels are abundant, and, as a rule, embryonic in structure. Some of these blood-vessels are in very close relation to the enclosed spaces containing the adult parasite. Numerous nematode embryos are found in parts of the trabecular meshwork. Here and there in this meshwork, abutting against the enclosed spaces, one finds portions of tissue which take on a different stain from the rest, and which contain minute empty channels, cut in various directions, having a diameter closely corresponding to that of the nematode embryos.

THE ADULT PARASITES.

As previously mentioned, the adult worm occupies the spaces enclosed by the trabecular meshwork of the "worm-nest." In some parts of the section the worm seems completely to fill up the space in which it lies, the projections which are present on its surface appearing to fit into corresponding depressions in the surrounding trabeculæ; in other places there is a certain amount of granular material separating it from the trabeculæ, whilst occasionally a collection of small round cells intervenes between it and the surrounding tissue. Hitherto I have failed to procure a complete specimen of the adult worm on account of the intricate meshwork surrounding and enfolding it. Careful attempts at extraction have resulted in removing comparatively small portions only; therefore I am at present unable to state whether one or more than one adult parasite occupies each "worm-nest." In every "nest" examined, however, there has been found one sexually mature female parasite with eggs and embryos in different stages of development. Portions of adult females, with uterine tubules full of ova and embryos, showed projections on the cuticular surface, and measured about .03 inch in breadth. Fig. IV. Dr. Cobb, of the Agricultural Department, Sydney, who is a recognised authority on nematodes, has undertaken to work out the question of the identity of the adult parasites, and, in due time, we shall be able to name and classify them.

THE OVA AND EMBRYOS.

Ova, in almost all stages, were seen in the interior of the adult females. For the most part they were ovoid in shape, and many had a blunted, spinous process at one extremity. Measurements of ova containing mature embryos averaged $26\ \mu$. by $40\ \mu$., or $\cdot 001024$ inch by $\cdot 001575$ inch. Fig. II. Embryos which had escaped from the ova showed very active movements when examined soon after removal from the carcase. Nor were the movements confined to those embryos, because *within* the more advanced ova the embryos could be seen to twist about in a remarkable manner. The embryos remain alive for several hours after the death of the animal acting as their host. Only a week ago I found them alive and active six hours after they had been placed on a microscopic slide, and at least eight hours after the death of the bullock containing them. On an average the embryos measure $4\ \mu$., or $\cdot 000157$ inch in width, and $\cdot 25$ mm., or $\frac{1}{40}$ inch in length. The body is round, the head slightly bulbous, with a circular discoid cephalic extremity. The tail is often curved, and invariably tapers to a fine point. No sac could be seen surrounding the embryos such as has been described in the case of the *filaria sanguinis hominis*. When examined unstained there was no trace of organs, the body being only slightly granular in appearance. Fig. III.

FATE OF THE EMBRYOS.

Much work remains to be done in determining this point. I have already stated that numbers of embryos were found lying free both in the capsule of the "worm nests" and in the trabecular meshwork, the majority of these occupying the lymphatic spaces, but an occasional one might be seen lying in the interior of a blood-vessel. On escaping from the parent it would appear that these embryos bore through the tissues in their immediate neighbourhood, and so gain access to the lymphatics, and possibly also to the blood-vessels. As yet, however, I have been unable to find them in the blood of cattle affected with "worm-nests," but my observations have been very imperfect. Future observations will, I feel sure, serve to demonstrate their presence in the blood of affected animals.

QUESTION OF HUMAN INFECTION.

The question of human infection from eating the meat of animals affected with these "worm-nests" is undoubtedly a very important one, considering their very common occurrence in this Colony and in Queensland. With the view of studying the life history of these worms, and, at the same time, testing whether they are capable of causing any harm when eaten, I had a young pup fed on "worm-nests" cut into small pieces. At first he was fed on "worm-nests" alone, sufficient being procurable for the purpose. The result was that he very speedily became thin and emaciated. On the addition of some bread to his diet of "worm-nests," however, he very soon regained his former condition, and continued to do well. At the end of fifteen weeks he was killed. All the organs were healthy. No nematode embryos could be found in the blood. No *living* embryos were found in the stomach or intestines, twenty-four hours having elapsed since his last meal; but numbers of partially-digested embryos were seen in the stomach and duodenum. This experiment having been carried out during the winter months, it is possible that the nematode embryos might have been less lively, and, consequently, more easily acted on by the gastric and intestinal juices than during the warm summer months. Be that as it may, it is very satisfactory to know

that this young dog suffered so little inconvenience even when fed almost entirely on these "worm-nests;" and if that be the case, when they are eaten raw and in large numbers, surely we may reasonably conclude that the risk is likely to be small after the meat has been properly cooked, and eaten by human beings.

In conclusion, I must express my thanks to the President of the Board of Health, Sydney, for allowing me to make free use of material supplied by the Health Department; to Mr. Stanley, Government Veterinarian, for valuable information; to Dr. Cobb, for his kind and able assistance; to B. Richards, Esq., the enlightened and liberal-minded proprietor of the Riverstone slaughtering establishment, for the facilities he so freely afforded me of carrying on my observations; and to Constable Gregor for his help all through. My best thanks also are due to Miss Isabel D. Hawks for so faithfully executing the drawings illustrating the paper.

To illustrate Dr. Gibson's paper
on "Worm-nests"

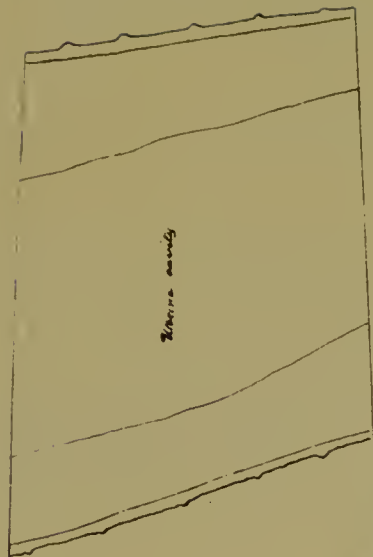


Fig. IX. X 400.



Fig. III. X 100.



Fig. I.



Fig. II. X 100.

Fig. I. Section of small "worm-nest" - natural size - showing

a. Capsule.

b. Space, cut in various directions, occupied by the parent worm.

Fig. II. Ova showing stages in the development of the nematode embryos. (Camera lucida drawing.)

Fig. III. Camera lucida drawing of - Free embryo.

Fig. IV. Camera lucida drawing of - Outline of adult female with outline of uterus, which, at this place was packed full of embryos.

. . . Note projections on cuticular surface.

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SCALE, 5/9 OF ORIGINAL DRAWING

Notes on some of the more Common Diseases in Queensland for the Quinquennial Period 1887-91, in relation to Atmospheric Conditions.

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It is the common experience of all of us, that every now and then we have a run of some special class of disease. At one time we may have under our care an unusual number of enteric diseases, at another time laryngeal diseases, and at another time acute diseases of the lungs. In some instances we are unable to account for this particular rush; whereas, in others, and with a certain amount of exactitude, we put it down to a more definite cause. Should we have a great number of cases of diarrhoea in November, December, and January, we think it is due to the excessive heat of summer, and if, on the other hand, we have an epidemic of pneumonia in the winter months we attribute it to the cold and dry westerly winds that usually prevail at that time of the year.

It may be said, in the case of alimentary diseases, especially in children, that the matter of diet is of more importance in point of causation than any seasonal atmospheric condition. We must bear in mind, however, that in general our diet is pretty much the same from one season to another, and almost certainly the same from one year to another; that in the former case, if there is any difference it is one in the right direction, and calculated to act rather as a preventive than an increased causative agent; and that in any case, any change made is not sufficient to account either for the large percentage of cases of gastritis, enteritis, and dysentery, met with during the hot months of late spring and early summer, or for the difference in mortality between one year and another. It is not impossible—it is rather probable—that the condition of the atmosphere in summer may be such as to effect some important changes in our food, and, consequently, the latter may be the *medium* through which some of these seasonal diseases are contracted. Although, however, our food may thus be the immediate cause of some diseases, the condition of the air has been the direct means of the change, and so has indirectly played the primary and essential part.

The same applies, and, perhaps, in even a more direct manner, to typhoid fever. Here we have a disease that is universally, and with truth, believed to be due to what is called an insanitary condition of our towns, villages, or districts, as the case may be; the specific germs being introduced either with our food or water supply through the stomach, or from some foul-smelling sewer, or cesspit, through the lungs. But these are conditions—if not affected by some other agent—that would certainly remain with us, with very little variation, all the year round. Our water supply comes from the same source, and our food continues absolutely the same from one year to another. We have the same earth-closet, sewerage, or cesspit system, and the same nature of soil all round us. If, during the summer, there is any noxious effluvium arising from some drain or rubbish heap, or cesspit, that does not exist in

winter, it can hardly be due primarily to the habits of the occupants of the town or district, for here again we have conditions—whatever these may be—characteristic of the individual all the year round, and that, probably, never change during a whole lifetime. A person whose backyard is untidy or uncleanly in summer, does not usually show more intelligent interest in matters pertaining to sanitation during the winter months, or, if so, the difference is not sufficient to account for the prevalence of typhoid fever at one time more than at another. Should he luckily escape the disease in winter, it surely is not because of extra care or good management on his part, but rather because nature has not supplied him with atmospheric conditions either in temperature or rainfall, or perhaps both, favourable to the propagation of those bacilli that are known to be the immediate cause of typhoid fever. It is quite possible that his constitution may be more robust during the winter months, and, therefore, more able to successfully resist the influence of these germs; but here, again, we have more evidence in the same direction, for if there be increased resistive power in winter it must be due to the stimulating properties of the weather, and, therefore, to difference in atmospheric conditions between the various seasons of the year.

So, also, in the case of phthisis. It is certain that conditions favourable to out-door exercise—dry, bracing, and pure air, and plenty of sunshine—act a more important part, not only in the treatment, but prevention of this disease, than all the active germicides we know of.

For many years the question of climate in the treatment and prevention of disease, notably chest affections, has created a great amount of interest, and several good authors in almost every country have given us the benefit of their experience and study in this particular direction. At the same time the very important matter of geographical pathology has been fully examined, and has developed from an investigation into the distribution of disease in localised areas such as that made by Haviland in 1875 on cancers, phthisis, and heart disease, in England and Wales, until the question has become of world-wide interest, as evidenced by the work of Hirsch,* Felkin,† and Davidson,‡ and now embraces in a systematic manner both hemispheres. In many cases certain meteorological readings are given, chiefly in temperature and rainfall, as bearing on the cure, causation, and distribution of disease; but on account of differences in latitude and longitude, in soil and physical conformation of the country between one place and another, it cannot be said that these observations in themselves, and with any certainty, have the same relation to health and disease as they may appear to possess. We know that although the meteorological observations of one district may be not unlike those of another, it does not follow that we may meet with similar diseases, nor, in the matter of treatment, that the effects on disease are the same in both places. Neither does it follow that because the atmospheric conditions are different between one place and another they may not both present the same diseases, and be equally effectual in mitigating the symptoms of, and, perhaps, in curing the disease. No matter, then, how carefully described by authors these meteorological readings may be, they can give us at best but an approximate estimate of their real value *per se* in relation to disease.

In forming a more accurate estimate of this connection between the two, it will be necessary, therefore, to compare the meteorological observations and mortality of one particular town or district not with those in another

* "Geographical and Historical Pathology."

† "Geographical Distribution of Tropical Diseases."

‡ "Geographical Pathology."

part of the world, where the configuration of the country may be very different, but with those obtainable in the same place—where local conditions are a constant quantity—from one month to another, one year to another, or, perhaps, for longer periods of time. Even here the relation shown can at present be but an approximate one, for with the exception of temperature and rainfall, the remaining elements that together with these go to constitute what is ordinarily called the “weather” have not received by workers in this particular line of study the attention they possibly deserve. Consequently, many mistakes will be made before an absolutely accurate idea of these matters can be formed, and before we can safely predict that certain diseases may possibly be expected in consequence of or in connection with certain conditions of the atmosphere; but that it is the method most likely to give a faithful interpretation there can be little doubt.

With this object in view, I have divided Queensland into eight large districts or divisions, and through the liberality of our Government, and the kind assistance rendered me by the Registrar-General’s Department, obtained the mortality statistics for each separate division, for the years 1887–91 inclusive. At the same time I have received a record of meteorological observations for the same districts and for the same period of time from Mr. Wragge, our enthusiastic meteorologist, who has taken a keen interest in the matter and assisted me in every possible manner. I have also obtained through the Government, returns from nearly all the hospitals in Queensland, and have thus been able to compare the observations not only with the death-rate but with the rate of admission to hospitals, for certain diseases for each division of the colony.

It must be remembered that the results obtained are only approximately correct as far as meteorology bears on the *causation* of disease, for the illness might have been of several weeks, and in the case of chronic diseases of several months duration, while hospital admissions, although showing a more direct connection, have the disadvantage of giving but a partial return of the diseases that prevail at any particular time or place. Moreover, a still greater objection lies in the fact that in many inland districts in Queensland, the population is too small to supply either from mortality or hospital statistics a sufficiently large number of cases. In order to overcome this difficulty, as far as possible, I have for Western Queensland, taken the mean of the meteorological observations of two stations that are far apart, such as Cloncurry and Hughenden, West Northern Queensland; Boulia, and Blackall, West Central Queensland; Roma, and Thargomindah, West Southern Queensland; and in one case the mean of three stations—Warwick, Toowoomba, and Dalby as representing the Darling Downs. These are thus made to represent, as they fairly do, the mortality and hospital returns of very much wider areas, and so give us a larger though perhaps less accurate basis to work upon. The same applies also to the other four divisions of the colony, although here there is only one observing station for each district.

It would also have been well had this comparison extended back at least ten years instead of five, but it is doubtful whether the meteorological observations recorded previous to 1887, when Mr. Wragge arrived in the colony, were as absolutely correct as those we now possess. It is also well to bear in mind that the population of Queensland increased from 322,853 in 1886 to 393,710 in 1891, and that consequently the total number of deaths—other things being equal—should increase in proportion from one year to another.

The following are the observing stations and the districts they represent:—

Observing Stations.	District Represented.
1. Brisbane	That portion of Moreton District within 30 miles of the coast lying between the parallels 27 and 28 degrees south.
2. Rockhampton	That portion of Port Curtis within 30 miles of the coast lying between the parallels 21 and 25 degrees south.
3. Cooktown	That portion of the Cook District near the coast, lying between the parallels of 14 and 17 degrees south.
4. Normanton	That portion of Burke inland from the Gulf of Carpentaria, lying between 17 degrees and 19 degrees latitude south, and 140 degrees and 142 degrees longitude east.
5. Cloncurry and Hughenden	That portion of Burke lying between 20 degrees and 21 degrees latitude south, and between 140 and 145 degrees longitude east.
6. Boulia and Blackall	That portion of North Gregory and Mitchell Districts lying between 22 degrees and 25 degrees latitude south, and between 140 degrees and 146 degrees longitude east.
7. Roma and Thargomindah	That portion of the Warrego and Maranoa Districts lying between 26 degrees and 28 degrees latitude south, and between 143 degrees and 149 degrees longitude east.
8. Warwick, Toowoomba, and Dalby.	That portion of the Darling Downs lying to the east of 151 degrees longitude east.

TYPHOID FEVER, QUEENSLAND, AS A WHOLE.

The mean monthly mortality curve of typhoid fever, for the quinquennial period 1887-91, for the whole of Queensland, shows a high maximum in January, February, and March, a rapid fall from March to April, a gradual decline from April to its minimum for the year in August, a low rate for September and October, followed by a sharp rise to December. This corresponds very closely to the curve of mean temperature, rainfall, number of wet days and amount of cloud, especially the three last-named. The following will show the death-rate according to population for each month and the ratio per cent. for four periods of the year:—

Mean mortality per 100,000 population per annum for each Month of the Year.

Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
72.0	73.2	69.6	42.0	44.0	33.0	30.0	15.6	21.6	21.6	38.4	54.0

Ratio per cent. for four quarters of the Year.

Jan. to Mar.	April to June	July to Sept.	Oct. to Dec.	Total.
41.3	23.9	12.9	21.9	100

It will be observed that the months of highest mortality are January, February and March, and of lowest death-rate August, September, and October, and that for every ten deaths that take place the latter period there are 44 the former. If, however, the year be divided into the ordinary quarters as above tabulated, it will be found that there are 32 deaths recorded the first quarter for every 10 the third quarter of the year.

Mortality per 100,000 population for the Years as a whole.

1887.	1888.	1889.	1890.	1891.
40.6	46.4	77.2	27.1	26.9

These figures show very plainly that the year of highest mortality is 1889, and that for the last two years the death-rate is particularly low. If the total number of deaths from typhoid fever in Queensland for the last five

years be taken into consideration it will be found that 35.4 per cent. of these occurred in 1889, only 12.5 per cent. in 1890, and 12 per cent. in 1891, or in the proportion of about three in 1889 to one during the last two years.

Mean monthly meteorological Observations for the Years as a whole.

	1887.	1888.	1889.	1890.	1891.
Barometer	30.016	30.074	30.055	29.986	30.031
Temperature	70.1°	71.7°	73.5°	71.7°	70.4°
Mean range	19.4°	21.6°	21.2°	19.9°	20.7°
Absolute range	35.4°	42.7°	42.0°	38.1°	37.8°
Humidity	71%	61%	63%	67%	63%
Rainfall	3.979	2.222	2.369	4.333	3.742
Rainy days	9	5	7	9	8
Cloud	3.9	2.9	3.7	4.2	4.1
Wind	11½	12½	12	12½	14½

In comparing the years of high or low mortality with this table there does not appear to be much difference in meteorological readings from one year to another, certainly not sufficient to account for the great difference in death-rate above noted, for the last three years. It is true that if we compare the atmospheric conditions of 1889 with those of 1887, 1890, and 1891, we shall find in the former case that the barometer, temperature, and absolute range of temperature, are high, while the rainfall and amount of cloud are equally low; but, if on the other hand, the observations of 1889 be compared to those of 1888, it will be found that, with the exception of mean temperature, they are even more pronounced in favour of a higher mortality the latter year. We shall see, however, later on that this offers no exception to but rather bears testimony in support of the ordinary rule, that typhoid fever is intimately associated with high temperature, low humidity and low rainfall, and that if these conditions in 1888 do not increase the death-rate for the time being they very materially contribute towards the exceptionally high mortality of the succeeding summer.

In examining the monthly tracings we find that this high mortality curve begins in November, 1888, and continues to rise steadily until March, 1889, when it attains its maximum, then suddenly falls from March to April, but still continues comparatively high till the end of July, the mortality for that month being greater—with the exception of January and February, 1887—than the maximum of any other year, even during the summer months. There are thus nine months of a continuously high mortality, a fair idea of which will be formed when compared with that of other years for the same period.

Mortality per 100,000 population per annum.

	March.	Jan., Feb., and March.	November to July.
1889.....	168.0	132.5	98.0
Other years...	45.6	56.4	39.0

It will here be seen that for the month of March, 1889, the mortality is nearly four times the average of other years, or in other words, almost equal to the total number of deaths that occur in the month of March for the other four years combined. If the mean mortality be taken for January, February, and March, or for the nine months from November, 1888, to July, 1889, the death-rate is nearly three times the average of other years during the same periods. We have already seen what the atmospheric conditions for the year 1888 as a whole are, but in order to follow closely this long period of high mortality it may be well to give the meteorological observations for a month or two previous to its commencement, and compare these with the mean of other years.

Mean monthly meteorological observations—Sept., Oct., and Nov.

	1888.	Mean of other years.
Barometer	30.099	30.030
Temperature	74.9°	73.1°
Mean range	25.7°	23.5°
Absolute range	47.3°	42.9°
Humidity	52%	58%
Rainfall	.691	1.764
Rainy days	3	6
Cloud	2.5	3.3
Wind	12½	13

This shows more distinctly even than the observations for 1888 as a whole, that preparatory to the rise in mortality, the barometer, mean temperature, and its mean and absolute range are high, while the relative humidity, rainfall, number of wet days and cloud are particularly and equally low.

The following are the meteorological observations for the months of December, 1888, and January and February, 1889 (and which correspond to the maximum mortality during the three first months of the latter year), and for comparison those showing the mean of other years:—

Mean monthly meteorological observations—Dec., Jan., and Feb.

	1888-89.	Mean of other years.
Barometer	29.965	29.851
Temperature	83.3°	79.4°
Mean range	23.7°	17.4°
Absolute range	44.2°	33.6°
Humidity	50%	67%
Rainfall	2.366	7.800
Rainy days	7	13
Cloud	3.7	5.1
Wind	11	12½

The difference in meteorological readings is here particularly well marked, the barometer, temperature and its mean and absolute range being on the one hand very high and on the other comparatively low, while the relative humidity, rainfall, number of rainy days, and amount of cloud are in the one case especially low and in the other equally high. We shall also find if a similar comparison be made for the next three months, that the continued high mortality in April, May, and June is associated with atmospheric conditions, if not as decided as, at least pretty similar to these:—

Mean monthly meteorological observations—March, April, and May.

	1889.	Mean of other years.
Barometer	30.097	30.040
Temperature	74.4°	71.6°
Mean range	18.0°	17.2°
Absolute range	38.6°	32.6°
Humidity	70%	74.2%
Rainfall	3.227	4.729
Rainy days	9	11
Cloud	4.2	4.5

In the above table, the year 1888 is left out, in forming a mean for other years, as it has been already suggested that it either directly or indirectly tends to increase the death-rate for 1889, and probably for that reason might rather have been included with that year to form a mean for the two.

That this supposition is absolutely correct, I think there can be little doubt. We have seen that the atmospheric conditions for the latter months of 1888 are intimately connected with the high mortality of the summer following,

and as these conditions obtain for sometime prior even to this, it seems highly probable that during the greater part of that year they are equally associated with the death-rate of the following year. If the various meteorological curves for the two years previous to the summer of 1889 be carefully examined it will be found that the barometer, temperature, and mean and absolute range of temperature have a gradual tendency upwards—that is to say these are higher during the winter months of 1888 than 1887, and during the summer months of 1889 than 1888—while the relative humidity, rainfall, number of wet days and amount of cloud have an equal and decided tendency downwards. One cannot indeed help coming to the conclusion that for a period of many months beforehand the weather is preparing the way, the atmospheric conditions becoming more and more favourable, for the development of those germs that are known to be the cause of typhoid fever, and that when these conditions culminate in a very high temperature, in the absence of the normal fall of rain during the summer months of 1889, the mortality rises to an extent beyond that observed for any other period under review.

REMARKS ON TYPHOID FEVER.

1. That it is essentially a disease of summer, and attains its maximum mortality and admission rate to hospitals during the month of February.
2. That according to hospital statistics alone the percentage of deaths is, on an average of five years, somewhat greater in summer than winter, and the mortality is all the greater in summer the more prevalent the disease and the higher the number of admissions.
3. That although the period of highest barometric pressure (winter) corresponds fairly to the period of lowest mortality, the higher the barometer during any season of the year the greater will be the death-rate.
4. That not only does the period of highest temperature correspond to the period of highest mortality, but the higher the temperature during any season of the year the greater will be the death-rate.
5. That although the period of highest mean daily and absolute range of temperature coincides with the season of lowest death-rate, the higher the range during any particular time of the year the higher will be the mortality.
6. That the season of highest mortality corresponds to the period of low relative humidity. It is possible that a specially high death-rate is, however, due chiefly to the low rainfall and high temperature attending that period; for, if the temperature be lower and the rainfall moderate, a higher relative humidity is coincident with a higher death-rate.
7. That although the period of low rainfall, low number of wet days, and low amount of cloud, corresponds to the season of low mortality, the lower these are during the months of summer the higher will be the death-rate.
8. That a high rainfall during the months of summer not only diminishes the mortality for that period of the year, but tends to do so also for the succeeding months of winter, even though the rainfall be then comparatively low.
9. That a moderately high rainfall during the winter months is not associated with a low death-rate if the temperature be comparatively high, possibly because the rainfall at that time is not sufficiently great to act the part of scavenger.

10. That for the district of Brisbane the north winds were very prevalent and the east winds less frequent than usual during the summer of highest mortality.

11. It follows from these observations:—

- (a) That the mean temperature of the air is the only element of the weather that is consistently attended by high or low mortality; that is to say, the period of highest temperature not only corresponds to the season of highest mortality, but the higher the temperature during any particular time of the year the greater will be the death-rate. The remaining elements of the atmosphere if *high* in summer (such as the rainfall) during the period of highest mortality, are attended by a lower mortality, the *higher* these are during any particular time of the year, and, conversely, if these elements be *low* in summer (such as the barometer and range of temperature) during the period of highest mortality the *lower* they are at any time the lower will be the death-rate. All those elements together, therefore, counteract the influence of a high temperature in summer and help to keep down the mortality. If they fail to attend a high temperature in summer the death-rate will rise very high.
- (b) That a high mortality during any period of the year is associated with high barometer, high temperature, and high mean daily and absolute range of temperature, together with low relative humidity, rainfall, number of wet days, and low amount of cloud.
- (c) That if these conditions continue and become more and more pronounced for a period of eighteen months (the seasonal fluctuations being of course excepted), it may safely be predicted that in the absence of the usual rainfall the following summer the mortality will rise exceedingly high.
- (d) That a low mortality is dependent upon atmospheric conditions the opposite of these.
- (e) That as the mean temperature and rainfall form the basis of the condition of the weather, a low mortality is primarily dependent upon a low temperature and high rainfall.
- (f) That in all cases during the summer months there is probably a tendency to the development of those bacilli that cause typhoid fever, but under a heavy rainfall their germination stage is interfered with and they are at once washed away.
- (g) That in order to prevent an epidemic of typhoid fever during a dry summer, we should imitate nature as much as possible by having our streets regularly watered and cleaned daily, and our drains largely flushed out for at least a couple of hours twice a week, and preferably, on account of its germicidal properties, with salt water. The former will prevent the dust with its organic *débris*, from being blown by the wind upon the roofs of our houses, and thence into our water-tanks along with the first shower of rain, while the latter will be a fairly effective scavenger.

REMARKS ON DIARRHŒA AND DYSENTERY.*

1. That for the whole of Queensland 85 per cent. of the deaths from diarrhœa occur in children under five years of age.

* The remaining diseases have been examined in a similar manner to typhoid fever, but our limited space will allow only the "General Remarks" being here inserted.

2. That for the whole of Queensland 29 per cent. of the deaths from dysentery occur in children under five years of age.

3. That the highest number of *admissions to hospitals* for diarrhœa, dysentery, and enteritis takes place during the fourth quarter of the year.

4. That the highest *mortality* from diarrhœa takes place during the fourth quarter, and from dysentery during the first quarter of the year.

5. That the period of highest admission rate for dysentery, and highest mortality and admission rate for diarrhœa, is not coincident with the period of highest temperature, but rather with the onset of the warm season during the fourth quarter of the year.

6. That this is probably due to the sudden rise in temperature following the cold of the previous winter, as well as to its very high range during this season of the year.

7. That thunderstorms are observed at this time more frequently than during any other season of the year, and it is highly probable that the sudden change from negative to positive electricity, and *vice versâ*, attending these, is associated with the high mortality from diarrhœa.

8. That the rising and high temperature, together with the electrical condition of the atmosphere, probably act both directly upon the nervous system, and indirectly through the food supply, in raising the mortality and admission rate at this time of the year.

9. That the influence of temperature in its relation to diarrhœa during the fourth quarter of the year is not a constant quantity, and depends materially upon whether the air be humid or dry.

10. That for the eastern portion of South and Central Queensland a high *admission rate* to hospital and *high mortality* from diarrhœa during the fourth quarter of the year are associated with a low temperature, provided it is accompanied by moderate rainfall, and either high relative humidity or very large number of rainy days. If these latter are, however, absent, a low temperature is attended by low mortality for that period. The higher the temperature, *if the air be dry*, the greater will be the mortality; the lower the temperature, *if the air be humid*, the greater will be the death rate.

11. That for the western and northern portion of the Colony a high *admission rate* to hospitals during the fourth quarter of the year is associated with conditions similar to those observed for the eastern and southern portion, whereas a high *mortality* is generally connected with a high mean temperature, whether attended by high or low rainfall and relative humidity.

12. That for the whole of Queensland a high mortality and admission rate during the *first* quarter of the year are coincident with a high barometer, high temperature, and mean daily and absolute range of temperature, together with low relative humidity, rainfall, number of wet days, and low amount of cloud.

13. That the mortality and admission rate during the *first* quarter will be all the greater the higher the barometer, mean temperature, and absolute range of temperature, and the lower the relative humidity during the last few months of the preceding year.

14. That generally the higher the mortality during the last quarter of the year (if dependent upon low temperature and high humidity) the *lower* it will be during the first few months of the succeeding year, and *vice versâ*.

15. That generally the higher the mortality during the last quarter of the year (if dependent upon high temperature and low relative humidity) the *greater* will be the mortality during the first few months of the year following.

16. That for the eastern portion of South Queensland (Brisbane) the highest mortality for the last five years during the fourth quarter of the year was coincident with a greater frequency of north and fewer number of east winds, than observed any other year for the same period.

17. That the influence of the velocity of the wind is doubtful, although it would appear that a high mortality is generally associated with low force of the wind.

REMARKS ON WHOOPING-COUGH.

1. That, unlike respiratory diseases generally, it attains its maximum mortality during the warm months of the year.

2. That a high temperature in winter is coincident with a high mortality for that period, as well as for the succeeding months of spring.

3. That a low temperature during the latter months of the year is associated with a high mortality for that period, as well as for the first few months of the following year.

4. That a moderate rainfall and high humidity are generally connected with high death-rate.

5. That the association of a high mortality with medium temperature for all seasons of the year, in combination with moderate rainfall and high humidity, supports the assumption of a germ origin for whooping-cough.

REMARKS ON DIPHTHERIA.

1. That, although the greatest mortality occurs in the autumn and winter months when the barometer is high, the lower the barometer during these months (1888, Brisbane excepted) the higher generally will be the mortality.

2. That not only do the months of lowest temperature correspond generally to those of highest mortality, but the lower the temperature during the first few months of the year the higher the death-rate for that period, the sooner it rises, and the greater will be its maximum for the year; and, conversely, the higher the temperature in January, February, and March, the lower the mortality for that period, the longer it will be in rising, and, possibly also, the less will be its maximum for the year.

3. That a comparatively low temperature in autumn and winter is coincident with a high mortality.

4. That an absolutely low temperature, however, beyond a given point (58°), in June or July, if attended by low rainfall, does not increase, but seems rather to cause a decline in the mortality.

5. That a low mean, and absolute range of temperature during the months of summer, and, possibly, also of autumn and winter, contribute towards a high mortality.

6. That the greater the relative humidity, and the sooner it rises during the early months of the year, the sooner the mortality rises for that year, and the greater will be its maximum in autumn and winter (1888, Brisbane excepted).

7. That, although the months of lowest rainfall correspond closely to those of highest death-rate, and the months of highest rainfall to those of lowest mortality, the greater the rainfall during the early months of the year the greater will be the mortality. That this high mortality will continue for a month or two even after the rainfall is reduced to, perhaps, below its normal amount.

8. That a high rainfall and high humidity during the latter part of the year not only seems to increase the death-rate for that period, but tends to bring about an early rise during the first months of the following year.

9. That the greater the number of rainy days the greater will be the mortality.

10. That the relation between the death-rate from diphtheria and amount of cloud is not so clearly defined.

11. That the influence of the wind in velocity and direction is, from monthly statistics, somewhat doubtful, although, upon the whole, a period of high mortality for the district of Brisbane is accompanied more by south than either west or south-west winds. This variation of wind currents during the winter months much depends upon the course of the high and low pressure systems, and on the geographical position of their centres of energy.* An anti-cyclonic or high-pressure system, near Lake Eyre, and a V-shaped barometric depression showing steep gradients between New South Wales and New Zealand, give strong westerly winds at Brisbane, and as the high-pressure area makes casting, so will the winds veer southerly, being the currents on its eastern or advancing side.

12. That atmospheric conditions favourable to the development of colds and catarrhs probably predispose to the development also of diphtheria.

13. From these observations it follows:—

(a) That whatever contributes towards cold and dampness of air during the months of autumn and winter causes an increase in the death-rate from diphtheria.

(b) That, as swamps and marshes increase the cold and dampness of any particular locality, independent, to some extent, of the condition of the weather, a thorough system of drainage is absolutely necessary to reduce the mortality from diphtheria for that district.

REMARKS ON PNEUMONIA.

1. That a low mortality generally occurs in the summer months, and is connected with low barometer and low mean daily and absolute range of temperature, high temperature, rainfall, number of rainy days and cloud, together with, for the eastern portion of the Colony, east and south-east winds.

2. That it rises in the autumn months in accordance with a rising barometer and mean daily and absolute range of temperature, a falling temperature, rainfall, number of wet days and cloud, and with a tendency to south-east and south winds.

3. That it rises to its maximum in the winter months on account of a continued high condition of the barometer, a fall in relative humidity of the air, a still further depression in temperature, rainfall and cloud, a further elevation in mean daily and absolute range of temperature to their maximum for the year, and, for the eastern portion of the Colony, south, south-west, and west winds.

* Wragge.

4. That it falls in the months of spring in sympathy with a reversal of all those conditions of the atmosphere above stated (except that of relative humidity, which falls to its minimum for the year), and with a return to east, south-east, and south winds.

5. That the sooner the absolute range of temperature rises, and the more rapidly the temperature falls in autumn, the greater will be the mortality for that period, and, if combined with a rapid rise in barometric pressure, it may even then attain its maximum for the year.

6. That a high temperature during the summer months contributes towards a high death-rate, if attended by low rainfall and low relative humidity and high mean and absolute range of temperature. That a low temperature in winter is not associated with a high mortality, provided its range is low, the rainfall moderate, and the relative humidity comparatively high. A rapid fall of several degrees from one month to another in winter is more intimately connected with a high death-rate than mere mean low temperature for several months together. The mortality attains a high maximum in winter if a rapid decline in temperature is accompanied by low rainfall and sudden rise in absolute range.

7. That the death-rate will be all the higher the greater the difference in absolute range of temperature, rainfall, and amount of cloud between summer and winter.

8. That a low rainfall in summer and autumn does not seem to affect the mortality so much as a low rainfall in winter, possibly because of the other atmospheric conditions being more favourable, and because the fall is never so low as is generally observed during the winter months.

9. That the influence of the force and direction of the wind cannot certainly be ascertained by mean monthly observations. In some instances for the Brisbane district, where the mortality is high, the south is the prevailing wind, and in others the west. The latter is probably more frequently associated with a high mortality. [*See Diphtheria.*]

10. That the death-rate will be all the higher the more frequently the wind changes and the greater its range during any particular period.

11. That, in a general manner, pneumonia is associated with atmospheric conditions that allow of greater loss of heat by evaporation and radiation than by conduction.

12. And that, in order to counteract as much as possible the effect of these atmospheric conditions, our clothing during the autumn and winter months should be of such material as to retard the loss of heat by evaporation more than by conduction.

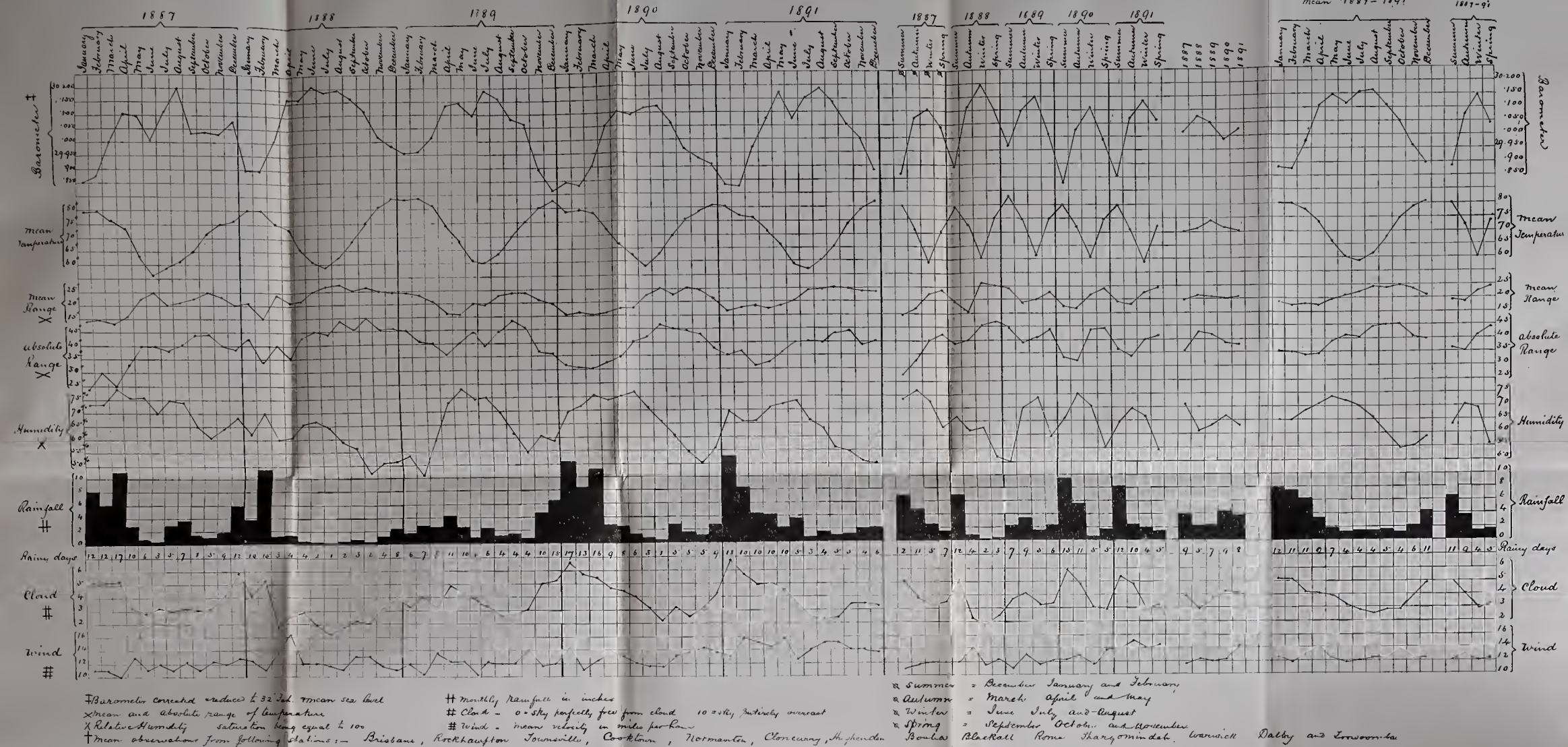
REMARKS ON PHTHISIS.

Bearing in mind that the observations made, apply to the mortality of a disease of a very chronic nature, and in no respect to its origin in relation to atmospheric conditions, it will be found:—

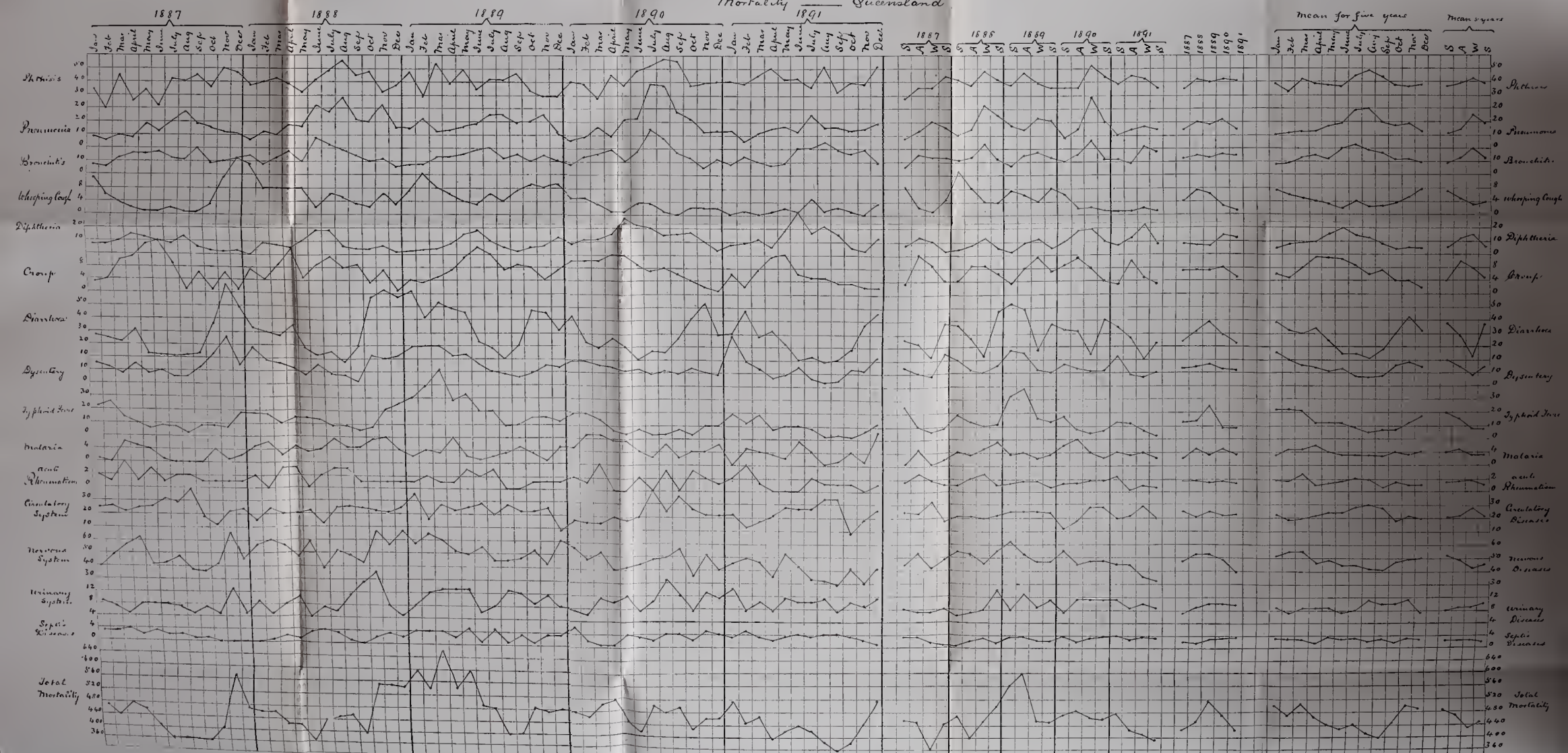
1. That a low barometer is generally associated with a low death-rate from phthisis.

2. That a comparatively low temperature in summer and autumn and a high temperature in winter are favourable to a low mortality, provided in all cases the mean and absolute range be low and the rainfall and number of wet days be high. A low temperature during the winter months is, however, favourable to a low death-rate if accompanied by a low range, high rainfall,

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and number of rainy days ; and, conversely, a high temperature in winter is not attended by a low mortality, unless the range be also low and the rainfall and number of wet days be high.

3. That the influence of the relative humidity is somewhat doubtful, although upon the whole a high humidity is connected with low mortality.

4. That the more uniform for the year the mean daily and absolute range of temperature, and amount of cloud, and the greater the humidity, rainfall and number of rainy days, the lower will be the mortality.

5. A year of heavy rainfall does not necessarily coincide with one of low death-rate, nor *vice versa*. The latter depends rather on the regularity or otherwise with which the rain falls from one season to another. The more uniform the fall the less extreme will be the death-rate.

6. That a heavy rainfall in summer is favourable to a low mortality during the succeeding months of winter, provided it is followed by a fairly high fall in autumn and winter, but if after a heavy rainfall in summer the winter becomes very dry, the death-rate will rise unusually high. On the other hand, a high rainfall in winter is beneficial only when preceded by a high fall the previous summer.

7. That a period of large number of rainy days is especially connected with one of low mortality.

8. That a year of medium amount of cloud is associated with a fairly uniform mortality. The lower it is in winter the greater will be the death-rate, especially if preceded by a period of great amount of cloud in summer.

9. That the influence of the wind, both in force and direction, is somewhat doubtful.

Notes on the Demography of North Queensland.

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WHATEVER view we take as to the way in which "Variations" in any given species originate, and whatever theory we adopt as to the particular method of evolution by which these variations tend, under certain circumstances, to become more or less ingrafted as fixed characteristics of the species—we are all, I suppose, agreed as to the facts that variations do arise, and that species do become modified—in a word, we are all, in some sense, evolutionists. It therefore becomes, I think, a subject of the greatest interest to consider whether our Race is becoming, to any appreciable extent, differentially modified in the various parts of the wide area comprised in the Australasian colonies; and, if it be so, to endeavour to trace out the factors concerned in such changes, the lines along which they tend, and—for us particularly—the pathological peculiarities with which, as cause or effect, they are co-related. Such an investigation can, I am aware, only be satisfactorily carried on by the collective method; and the time is, one may hope, not far distant when a society will be established amongst us for the special purpose of investigating and recording such phenomena of Racial evolution and pathological tendency as may from time to time be observed amongst the inhabitants of the different portions of the Australasian colonies. As a small contribution towards such collective investigation, I have brought together the following fragmentary notes and observations on some of the points that appear to me, after seven years residence, to be noteworthy in the demography of Northern, or tropical, Queensland.

The time since settlement took place in Northern Queensland is shorter than in the case of any other portion of the Australasian group—so short in fact that it seems, at first sight, impossible that racial evolution can have begun to show itself. But, on the other hand, it must be borne in mind that the conditions of life in tropical Queensland are such as might reasonably be expected to exert a very marked effect on any race brought under their influence; particularly a race like our own, to which the new conditions are entirely foreign.

That a certain amount of modification of type is already observable is the opinion of the majority of our professional brethren in North Queensland. Dr. Ahearne, of Townsville, some two years ago issued a circular inquiry bearing on this matter, and in a paper, subsequently read before the North Queensland Medical Society, he said: "The result goes to show by a majority of expression: That a modification of type is in course of formation. That the change is evident from the age of three till the second dentition. That it asserts itself by a pallid appearance, a wiry physique, and a nervous temperament."

Allowing, as I think you will, a certain amount of truth in this expression of collective opinion, we are led to inquire into the nature and the *modus operandi* of the modifying agencies.

Of the physical conditions which constitute climate, the most generally characteristic of North Queensland is elevation of temperature. Now, how does a hot climate affect the constitution of individuals and of races? Dr. Ahearne, in the paper referred to, declared his belief that it does so by inducing anæmia, and in support of that view he makes the following quotation from Hirsch* :—"There seems hardly any question that the peculiar influence of tropical climates, which is called relaxing, and which cannot be otherwise defined in physiological terms, is, for white people not habituated, a very material factor in the development of this disorder of nutrition (anæmia). Experience shows, moreover, that the anæmic habit of body in white residents of the tropics communicates itself to their offspring, and therein lies the chief obstacle to the acclimatisation of the white race in the tropics." The kind of anæmia here referred to is obviously oligocythæmia, for no one, so far as I know, has brought evidence to show that the plasma is impoverished.

That a tropical climate does produce anæmia of this kind I admit, and also allowing that acquired constitutional characters tend, in some way, to become the characters of the race—whether by direct heredity†, or some form of selection or reversion‡—a more or less anæmic race is a necessary corollary. But I cannot bring myself to regard this anæmia, in the individual or in the race, as pathological. To me it appears, so far as it is due to heat alone, to be wholly adaptive—at any rate in the first instance—and for this reason : In cold climates many red blood cells are required to carry the oxygen necessary for the generation of much heat. In the tropics no such heat production is required, and comparatively few cells suffice to carry what oxygen is needed for private use, if one may say so, of the various tissues. By the law of *compensation and economy of growth*,§ nature thus gains something, on the item "blood cells," which is available in other directions for, as Goethe expressed it, "in order to spend on one side nature is forced to economise on the other side."|| What vital energy is thus, and by any other means, conserved, is, I believe, far more than counter-balanced by the heavy and constant demands made by the governing mechanism of organic life. For of nothing am I more firmly convinced than that the brunt and burden of life in tropical Queensland falls primarily on the nervous system. The "relaxing," or, as I would prefer to call it, the *devitalising* influence of tropical climates, spoken of by Hirsch, is, I believe, to be referred directly to exhaustion of the vital nerve centres rather than to anæmia. Though it is conceivable enough that, by the law of compensation just referred to, nature, to satisfy the imperative demands of the vital nerve centres, has to pinch unduly some or all of the other organic functions—the formation of red blood cells amongst others; and pathologic anæmia may be, doubtless, sometimes thus produced.

But anæmia, besides being regarded as a morbid effect of tropical life, has also been credited with being the essential factor of nearly all diseases in tropical climates.¶ My experience in tropical Queensland does not bear out this view. The European newly arrived, still rosy—*plethoric*, one might almost say in relation to his new conditions—is notoriously more prone to all the diseases of tropical life than the more anæmic resident. And he feels the relaxing, enervating effects of the climate at least as much. Doubtless

* "Geographical and Historical Pathology."

† Herbert Spencer : "Factors of Organic Evolution."

‡ Wallace's "Darwinism."

§ Darwin : "Origin of Species."

|| *Ibid.*

¶ Sullivan : "Endemic Diseases."

anæmia is common enough in North Queensland as a consequence of that scourge of tropical climates, malaria. But as a distinct cause of disease, I do not think it more common than in cooler climates. Most of the phenomena involved in that process of adaptation which we call "acclimatisation," may, I believe, be explained by reference to the nervous system. Consider the case of a full-blooded new-comer in hot weather: his face is flushed, his superficial vessels are distended, he sweats profusely, he puffs and blows, and all the while is painfully conscious of the heat. In a word, his thermolytic mechanism is in full swing, and, being unused to such efforts, soon wearies, and our friend feels consequently oppressed. But after a while his thermolytic apparatus gets better educated to its work and performs it more easily, so that he feels less oppression. This, I should say, is the first regular step in acclimatisation.

That the thermo-regulative mechanisms are thus susceptible of education by the demands made upon them from without, is suggested by the immunity from evil consequences, which seems to be acquired by persons such as stokers, Turkish bath attendants, sailors, &c., who are constantly obliged to subject themselves to extremes of heat and cold that would be highly dangerous to persons unaccustomed to such changes. The effect of this kind of education of the thermolytic mechanism by habit is also well seen in the case of sunstroke. "Acclimatisation," says Sir Joseph Fayrer,* "has considerable influence in conferring toleration. New arrivals are more prone to suffer than those who have become accustomed to the climate. It is well known that the native can bear an amount of sun on his shorn head, neck, and half-naked body with indifference, if not pleasure, that would very soon prostrate a European. But to a temperature of the air rising above a certain standard all succumb." That standard I take to be the point at which, even in the best-trained thermolytic centre, stimulation becomes so excessive that response is no longer possible, and thermolytic exhaustion or paralysis ensues. The thermogenetic centre is then unopposed, and the patient presently becomes hyperpyrexia. If this be the true pathology of the hyperpyrexial form of insolation, it has occurred to me that, in addition to the usual means taken to reduce temperature, the hypodermic use of small doses of strychnine might prove useful by re-enforcing the over-taxed thermolytic centre, just as it proves useful in snake-bite,† and, as I have myself proved, in the profound coma of opium-poisoning. In all three cases the vital centres in the medulla are, though by different agencies, overwhelmed; and the rationale of the strychnine treatment is to re-enforce them.

Sunstroke, however, is by no means common in North Queensland. I have myself seen but one genuine case of the hyperpyrexial form. This occurred in a "new ehum" servant girl. The temperature quickly rose to 107.7° Faht. Convulsions and coma were present. Cold affusions and packing were employed for many hours, and recovery ensued. Doubtless, sunstroke occurs more frequently in the moist heat of the coast than in the high dry atmosphere of the inland downs, where my observations have been made; and for the very obvious reason that the thermolytic mechanism is more apt to be taxed beyond endurance in a hot and muggy atmosphere than where the air is dry, evaporation consequently rapid, and cooling effectual.

The beneficial effect of acclimatisation in diminishing the fatality of febrile diseases in the tropics is, I think, suggested by the following record, though, of course, the numbers are too few to be of any great value:—Of the 1,000

* Art. "Sunstroke:" Quain's *Dic. Med.*

† Dr. Müller and various writers.—*Aust. Med. Gazette.*

Europeans admitted to the Hughenden Hospital previous to 30th June, 1892, 221, or 22·1 per cent., have been classed as suffering from malarial, typho-malarial, and typhoid fever—that is to say, leaving the question of precise nomenclature out of consideration, there have been 221 cases in which fever was the essential element. Now, of these 221 cases, 8, or 3·6 per cent., died, and 213, or 97·6 per cent., recovered. The average length of residence in Queensland, previous to admission, of those who died was 7 years and 4 months; and of those who recovered, 9 years and 3 months, or a difference of 2 years. One, however, of those who died was a middle-aged man of 30 years' residence, and this case, in such a small number, unduly influences the general result. Exclusive of this case, the average previous residence of those who died was 3 years and 10 months, *i.e.* 5 years and 6 months less than the average residence of those who recovered; and this, in spite of the necessarily greater average age of the older residents. Should these results be confirmed by more extended research, they would, I think, tend to show that the power acquired by the thermo-regulative mechanism by constant exercise in protecting the body against external heat is also, to some extent, operative in protecting it against excessive heat production from within. Most of the fevers above referred to were distinctly malarial; the great majority continued fevers of the remittent type. A few were intermittent, and still fewer typical typhoid. Time forbids my entering into details as to the peculiarities of typhoid fever as seen in tropical Queensland; moreover, they are such as appear to be common to all hot and malarious climates.* But the remarkable modifications observable in this disease are most interesting in themselves, and also most suggestive as to the modifications which may be effected in other diseases of microbic origin.† Indeed, if we admit that climate effects a change in the bodily constitution, a change in the complexion of microbic disease seems to follow of necessity; if one of the factors be changed, the reaction cannot remain constant. And we have further to remember that the other factor—the microbes—may be, and probably is, as much or—since they are less highly organised—*more* modified by climatic conditions than our own bodies. In support of this it is only necessary to refer to the enforcement or attenuation in virulence of many kinds of pathogenic microbes, effected by cultivating them at various temperatures.‡ Sunlight and electrical conditions are likewise known to be modifiers of micro-organisms.§

The climate of North Queensland seems blamable for the great prevalence of such complaints as boils, whitlows, abscesses, carbuncles, and necrosis of bone; or, in bacteriological language, it seems to be a favourite haunt of pyogenic cocci.||

To this same category probably belongs a very prevalent cutaneous disease popularly known as "Barcoo rot," but not mentioned in nosological tables. This complaint is, as far as I know—though I speak with diffidence,—peculiar to North Queensland. It is characterised by superficial sores upon exposed parts of the skin, generally on the backs of the hands, wrists, and fingers, but it occasionally appears on the face and on the bare legs of children. A watery bleb forms, which soon becomes purulent, bursts, and leaves a superficial ulcer, which spreads circumferentially beneath the epidermis, the ulcer

* MacLean: "Diseases of Tropical Climates." Compare also Sir C. A. Cameron's Cavendish lecture on "Some points in the Etiology of Typhoid Fever."—*Lancet*, 12th January, 1892. Also, "Note on the Fevers prevalent on the Shores of the Mediterranean and Red Seas," by Dr. G. H. Milner.—*Lancet*, 18.7.92.

† Vide paper on "Tropical Measles," by Dr. J. Cantlie, of Hong Kong.—*Lancet*, 25.6.92.

‡ Klein: "Micro-organisms and Disease." Crookshank: "Manual of Bacteriology."

§ Griffith: "Micro-organisms."

|| Murchison ("Treatise on continued fevers") records a suggestive instance where typhoid, malaria, and boils followed each other in regular sequence for several years in a particular district.

being generally more or less covered with scales and scabs. The same kind of sore is very prone to attack any exposed part that is ever so slightly injured by a scratch or blow, and the hands of bushmen are rarely free from it at certain seasons of the year. The disease is due to a micro-coccus occurring singly and in chains. It grows well on agar and potato at ordinary and blood temperatures, forming a light drab or buff-coloured creamy layer. It produces abscesses in cats and dogs, and severe phlegmonous inflammation in man, when, as sometimes happens, he becomes inoculated by means of a wound passing through one of these sores. This complaint is easily curable by removing the loosened zone of epidermis and applying antiseptics.

It is somewhat remarkable that pyæmia and erysipelas—diseases also attributable to pyogenic cocci—are rare, at least in my experience, in North Queensland; the few cases I have seen have been mostly associated with disease of bone.

Amongst other prevalent diseases of North Queensland may be mentioned malarial fevers (which, however, appear to be on the decline with the fuller stocking up of the country*) and their usual associate, dysentery. Trachoma, which is enormously prevalent in the western districts, and epidemic conjunctivitis; uterine flexions and versions and parturient inertia; premature senility and nervous breakdown; summer vomiting, sometimes known as "Barcoo vomit," a disease occurring in hot weather, coming on suddenly after the first morsel of food is taken, unaccompanied by nausea or prostration, and probably due to undue irritability of the vagus centres; acute rheumatism and chronic rheumatoid arthritis, both, in spite of the dry atmosphere, of common occurrence; melancholia, or "Bush madness," the combined effect of solitude, nervous exhaustion, malarial poison,† and alcoholic excess.

Such are some of the more prevalent diseases of North Queensland. Most of them are doubtless more or less directly due to "climate" causes, and are so far, unavoidable. There is, however, an enormous amount of *preventable* disease for which alcoholic excess is largely responsible. Unfortunately the liquor traffic yields large revenue; hence Governments are wont to overlook the fact that for them as for individuals it is possible *propter vitam vivendi perdere causas*. So the traffic thrives, and the people suffer!

The *inland* climate of North Queensland is, however, distinctly beneficial in respect to certain affections, both in a preventive and curative sense. Diseases of the respiratory system generally, are, as might be anticipated, relatively uncommon; spasmodic asthma usually disappears; so also does the bronchial catarrh with which it is not infrequently associated. It is, however, in respect to phthisis and other tubercular affections that the advantages of the climate are most obvious. During seven years residence I have seen no case develop‡ in this locality; and I have invariably observed a very decided improvement in all imported cases where the disease was not so far advanced as to make improvement impossible. And even in such cases life has been prolonged in a very remarkable way. In the cases that have come under my care "climate" has, I believe, been the most important medicament. I have, however, endeavoured to enhance the beneficial effects of climate by measures designed to impair the vitality of the bacilli, and to

* Percentage of cases of malarial fever treated in the Hughenden Hospital during the last six years :—
1887, 35·2 per cent.; 1888, 30·1 per cent.; 1889, 20·9 per cent.; 1890, 15·06 per cent.; 1891, 19·1 per cent.;
1892, 8·5 per cent.

† Griesenger: "Mental Diseases."

‡ In the case of European. A form of broncho-pneumonia is the most fatal disease amongst the aborigines.

stimulate the autoprotective powers of the tissues against them. Details of these methods would here be out of place, but I may perhaps be permitted to say that the daily application of the constant current to the neighbourhood of the pneumo gastric nerve, with a view of promoting the nutrition of the injured lung-tissue, has seemed beneficial; and that, as an internal medication, iodine in one form or another, has appeared most useful. Given in the shape of iodoform (which contains nearly 97 per cent. of iodine) in gradually increasing doses up to 20 grains per day, has given excellent results as regards increase in weight, lessened cough, and decrease in the number of bacilli in the sputum. All patients, however, do not well bear this saturation with iodoform. I have lately employed iodine combined with zinc. The iodine for its effect on the bacilli, and the zinc with a view of determining a fibrotic rather than a pneumonic process in the lung in response to the irritation of the bacillus and its products; for zinc, we know, stimulates the cells towards fibre formation and consequent healing in external wounds. It has been injected into the neighbourhood of tubercular joints by Professor Lannelongue with the same object. May not zinc, given internally in considerable quantities, have a similar stimulating effect on the leucocytes or other elements concerned in fibre formation? The plan I adopt is to give iodine of zinc combined with albumen; that is to say, iodo-albuminate of zinc. The drug so combined seems better tolerated by the stomach. Twenty-five to 35 grains of the iodo-albuminate can be given daily, in divided doses. But of course this amount can only be reached by degrees. It is well to begin with very small doses, such as half a grain.

Whether I am right or not in my view of the action of this treatment there can, I think, be no doubt that; (1) the general condition of the patient is improved; (2) the total number of bacilli in the sputum is diminished; (3) the proportion of bacilli incorporated in the leucocytes or pus cells is very greatly increased; and (4) degeneration can sometimes be observed in the incorporated bacilli,—at any rate they appear smaller, thinner, and less granular or beaded. These results can only be observed after a continuance of the treatment for many months.

Whether, in North Queensland, those natural agents which constitute "climate," such as temperature, oxygen, sunlight, electrical and barometrical conditions, and the like, exert an inimical influence on the microbes concerned or whether they tend to confer an increased resisting power on the tissues, it is hard to say.

The Registration of Still-births and the Protection of Infants.

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THE subject of registration of still-births is not one which is now brought forward for the first time. Again and again have medical men urged the necessity for passing into law a measure for the compulsory registration of still-births, but without success. Yet the great public importance of the subject must be my apology for bringing the present paper before you to-day. In this paper I shall confine myself to the question as it is affected by the laws of New South Wales, and I hope to show how the difficulties in the way of registration may be removed by simple and effective means.

In the year 1886 a Select Committee was appointed by the Legislative Council to inquire into the state of the laws relating to the registration of births, deaths, and marriages in this Colony. In the course of the report, presented to the House, occurs the following:—"We find that no provision is made for the registration of births of any still-born children, and we believe, from the evidence which has been given before us, that this circumstance affords facilities for the concealment of crimes against the lives of young children." The only Act which refers to still-born children is the "Children's Protection Act, 1892," which lately came into force in some parts of the Colony. Section 16 of this Act provides that "when a woman is delivered in a lying-in home of a still-born child, no interment of such child shall take place without its being authorised by the certificate of a duly qualified medical practitioner, or of a Stipendiary or Police Magistrate, or officer of the police not under the rank of a sergeant, who has made personal inquiry into the circumstances, &c." This section further provides for penalties, and also allows exceptions under certain conditions when the lying-in home is situated more than fifteen miles from the nearest medical practitioner, magistrate, or officer of police. The Act defines a still-born child to be one which is "born dead, after the commencement of the sixth month of pregnancy." As will be observed, this section applies only to still-births occurring in a lying-in home. The Act does not require any certificates in cases which occur outside these institutions. At present it is actually forbidden to register still-births, on the assumption, I take it, that a child which has not breathed and existed apart from the mother is not a human being, but a lifeless mass which may be disposed of by burial in a back yard or other convenient spot on the parents' premises. Why should still-births be registered? It is a well-known fact that the majority of infants perish during the process of birth, and it is to be feared that some of them are hastened to a better world to save the characters of the parents, for if the child live, the birth must be registered, but if the child is still-born all is over—there is no registration of birth or death, there is even no interment required. This is a direct incentive to crime.

If the suggestions which I shall offer should be acted upon, concealment of birth, infanticide, and the numerous evils now so common in our midst would become crimes of the past. It is well known that still-births are far

more numerous among illegitimate children than among those born in wedlock. The proportion of still-births in legitimate children is estimated at about 1 in 20, or 5 per cent. of the total number of births; while in illegitimate children it is about 1 in 8 or 10—about 10 to 12 per cent. In primiparous women the proportion of still-births, in all cases, is 1 in 12; in pluriparous, 1 in 32.

I have taken notes of 200 consecutive cases which I attended in my practice. Of these 200, 187 were live-born and 13 still-born; of males (105), 97 were live-born and 8 still-born; of females (95), 90 were live-born and 5 still-born. Therefore, the proportion of still-born children to live-born of both sexes is 13 to 187, or about 1 in 15. The proportion of still-born males to live-born males is 8 to 97, or about 1 in 13. The proportion of still-born females to live-born females is 5 to 90, or 1 in 19.

These notes were taken of cases in a mixed practice, but I have not been able to ascertain the proportion of legitimate to illegitimate births. As the law stands at present, any person—no matter how unskilful or illiterate—may certify that a child has been born dead, and there is no way of disproving the assertion, except by a criminal prosecution for concealment of birth. Even then the law presumes the child to have been born dead, unless the contrary be proved; the onus of proof of live birth lies with the prosecution. This proof is, I need hardly say, a very difficult matter to obtain. One witness before the Select Committee referred to stated that a woman might deliver herself of a child, make away with that child, absolutely conceal the birth of the child, and then write a certificate herself, purporting to be from a midwife who attended her in labour, and delivered her of a supposed still-born child, and there would be no means of detecting it.

During the year 1891 forty-eight still-born children were interred in the Waverley Cemetery, the fact of still-birth being certified to by legally-qualified medical practitioners in twenty-nine cases, the remaining nineteen infants being interred with a certificate from a nurse or midwife. As it is unnecessary to inter still-born infants, this number does not indicate the true proportion of still-births to live-births.

It may not be out of place for me to give here a few statistics relating to live-born infants who have survived their birth but a short time, in order to show the necessity for more stringent laws than at present for preventing the destruction of new-born children.

During the year 1891 (I quote from the Government Statistician's Report) 14,008 births were registered in the metropolitan division (Sydney and suburbs). The total number of deaths during the same year of children under the age of 1 year was, in the city of Sydney, 664, or 18.79 per cent. of the births; and in the suburbs, 1,411, or 13.47 per cent. of the births. Among the causes of death we find: "Starvation, want of breast-milk," 81; "premature birth," 208, or 10 per cent. of the total number of deaths under 1 year. Of 402 deaths, at all ages, from ill-defined and not specified causes, 374, or over 93 per cent., were under the age of 1 year. Under this heading we find debility, atrophy, inanition, &c. During the month of January, 1892, 155 deaths at all ages were registered in the city of Sydney. Of these, 6 were from want of breast-milk, 3 from premature birth, 1 from cross-birth. In the suburbs, 371 deaths were recorded. Of these, 13 were caused by premature birth, while 40 are set down under the heading of atrophy, debility, inanition, &c. The deaths from diarrhoea, of children under 5 years of age, numbered 39, of which 32 were of children under

1 year old. The total number of deaths of children under 5 years of age was 277, or 52·66 per cent. of the total mortality, 210 of these being under the age of 1 year.

In the following table will be found the total number of deaths of children under 1 year, with the number of deaths registered as having been caused by premature birth, for each year from 1887 to 1891:—

City and Suburbs.

Year.	Total number of deaths under 1 Year.	Deaths caused by Premature Birth.
1887.....	1,890	169
1888.....	2,084	194
1889.....	2,301	171
1890.....	1,823	216
1891.....	2,075	208

In the following table will be found more detailed information regarding each district included in the metropolitan division for the year 1891. In it will be found, under the name of each district, the total number of deaths under 1 year and the number of deaths from premature birth:—

District.	Deaths under 1 Year.			Deaths from Premature Birth.		
	M.	F.	Totals.	M.	F.	Totals.
Sydney.....	356	308	664	35	38	73
Balmain	64	60	124	4	1	5
Leichhardt	38	42	80	1	2	3
Glebe	68	38	106	14	6	20
Newtown	65	43	108	7	7	14
Camperdown	25	26	51	.....	.....	.....
Macdonald Town	26	13	39	.....	.....	.....
St. Peters.....	12	17	29	.....	.....	.....
Redfern	58	70	128	7	8	15
Darlington	3	6	9	.....	.....	.....
Waterloo	33	29	62	1	7	8
Alexandria	31	28	59	.....	.....	.....
Botany	16	12	28	.....	.....	.....
Paddington	48	44	92	10	7	17
Randwick	4	17	21	1	3	4
Waverley	22	22	44	.....	5	5
Woollahra	33	23	56	1	2	3
Ashfield	34	32	66	4	1	5
Burwood	17	16	33	3	1	4
Five Dock	3	1	4	.....	.....	.....
Drummoyne	2	3	5	.....	.....	.....
Marrickville	47	23	70	8	2	10
Petersham	23	20	43	3	3	6
Canterbury	3	5	8	2	1	3
Hurstville.....	9	3	12	.....	.....	.....
Kogarah	5	3	8	.....	.....	.....
Rockdale	13	6	19	1	1	2
St. Leonards	44	28	72	3	5	8
Manly	4	10	14	.....	2	2
Ryde and Hunter's Hill	11	10	21	.....	.....	.....
Totals	1,117	958	2,075	105	102	207*

* The Government Statistician gives the number as 208, but from the information to hand I make it 207. The difference is, however, very slight.

Let me quote from Mr. Coghlan's "Wealth and Progress of New South Wales" (1889). Speaking of death-rates for a series of years, from 1871 to 1888, he says:—"Turning to deaths under 5 years, which may be generally termed the ages of infantile life, the chief factor of the excessive death-ratio of the city and suburbs will be found:

Districts.	Per 1,000 of Mean Population.		
	Maximum.	Minimum.	Mean.
Colony	53·64	32·56	43·73
City	105·64	50·50	71·47
Suburbs	86·99	46·02	68·12
Country	40·37	24·00	33·86

"The lesson conveyed by the above table is a very striking one. The minimum death-rate of infants in the suburbs exceeded the maximum rate in the country by about 14 per cent., and the minimum of the city exceeded the country maximum by over 25 per cent. The mean rate of the country was not half that of the suburbs, and only about 47 per cent. of the city rate." And again: "All satisfaction in regard to the low death-rate is confined to the country districts. As far as Sydney and its suburbs are concerned there is no cause for congratulation; on the contrary, the rate at which children of tender years drop into the grave forms a pathetic commentary on the civilization of the Colony." And yet again: "The (death) rate for Sydney is swollen by the deaths of children of tender years, whose lives are often needlessly sacrificed."

The suggestions which I would offer are as follows:—

1. Let all still-births, after the fifth month of intra-uterine life, be registered in a separate register, which shall be open to inspection only by persons specially authorised in writing by the Minister of Justice or his deputy.

In his evidence before the Select Committee, Dr. Knaggs stated that he was riding through a mining village near Newcastle some years ago, when he was called in to view the body of a child which had been born the previous night. It appeared that three female neighbours had been rendering assistance to the woman in her labour, and during the process of birth they had strangled the child unintentionally. It had all the appearance of a child that had been strangled during birth. These women would not hear of sending for a doctor to assist at the birth, and Dr. Knaggs, finding the child dead, insisted upon their going to a Registrar and registering it, but, as it appeared to have been a still-birth, the Registrar would not register it, nor would he refer them to the Coroner, on the ground that it was not within the province of the Coroner to hold inquests on still-born children. Dr. Knaggs mentioned this to show that there ought to be supervision over still-births. As before remarked, section 16 of the Act does not require registration, but merely that still-born children born in a lying-in home should not be buried without a certificate. I have chosen the fifth month as the earliest period of intra-uterine life for which registration should be compulsory, because at that time any intelligent person may learn to easily distinguish the age of the fœtus. For instance, about that time the nails begin to form, and the hair commences to appear on the head. Besides, this is the earliest period at which a child might be born living. I would not have the register of still-births open to the general public, for then the

parents or friends of illegitimate children would not be willing to register, for fear that the record of their sins would be exposed to the gaze of morbidly curious persons. For this reason, also, I would have a separate register.

2. Close up all private lying-in homes, now so numerous in this city, or license some of them to take in a certain number of women for confinement. All confinements occurring in such homes to be under the care of a duly-qualified medical practitioner, who shall report the results of such confinements to the proper authorities. All such homes to be open to inspection by properly-authorized inspectors.

I would offer this suggestion because it is an undoubted fact that in many of these institutions still-births are of such frequent occurrence that it becomes a matter of grave doubt whether the proper precautions are taken to preserve the life of the unborn infant. Undoubtedly many, and I hope the majority, of these institutions are conducted in the best possible manner, yet there is no shutting the eyes to the fact that there are many which exist for the sole purpose of concealing the births of children whose esentcheon bears indelibly the bar sinister.

Section 13 of the Act provides that "every person in charge of a lying-in home shall furnish records, as provided in Schedule C of this Act. and forward the same to the Registrar for the district in which such person resides within a period of two weeks from the occurrence of each birth in such home," under a penalty. A lying-in home is defined in section 28 as "a house in which more than one woman is received for confinement for payment of money either at the same time or within a period of two months." The wording of this definition is open to exception. It is not clear whether the home is one in which more than one woman is received either at the same time or within a period of two months, or whether the time refers to the payment of the money. Again, payment of money is required, while in other sections of the Act "payment of money or other valuable consideration" is stated. The Act does not provide for the registration or licensing of such homes.

3. All deceased children, whether still-born or live-born, should be interred in a regularly-constituted cemetery.
4. No interment should be permitted in any cemetery without the production of a certificate from a duly qualified registered medical practitioner, who should certify, if possible, the cause of the still-birth. Should there be no such certificate forthcoming, a *post-mortem* examination by a medical practitioner should be insisted upon.

Under the before-mentioned section 16, a sergeant of police who has made personal inquiry into the circumstances may authorise the interment of a still-born infant. Now, a sergeant of police, no matter how excellent an officer, does not pretend to any medical knowledge, and is therefore not capable, in the majority of cases, of certifying the fact of still-birth. In the absence of a medical certificate a *post-mortem* examination of the body should be made by a duly-qualified medical man. A case was mentioned before the Select Committee of the Upper House where a child was interred on the certificate of a midwife as still-born, when, in reality, it was nearly two months old at the time of its death.

5. Let the State take upon itself the care of illegitimate and neglected infants.

Illegitimacy is not the infant's fault, and we all know that the children may grow up and become as healthy and as useful citizens as those which are born in wedlock. If this suggestion were carried out there would be no motive in getting rid of the infant, as is, undoubtedly, often the case at the time of birth, when the distracted mother finds attached to her a child of sin, which seems to point at her the finger of scorn, and curse the mother who bore it without the approval of society. I have no hesitation in asserting that, were these suggestions passed into law, concealment of birth would be impossible, there would be little temptation to destroy life during birth, and baby-farming, with its horrible atrocities and wholesale destruction of infants, would no more be heard of in the fairest land of the Southern Seas.

APPENDIX A.

Works referred to in the course of this paper :—

New South Wales Legislative Council—Report from the Select Committee on Registration of Births, Deaths, and Marriages; together with the proceedings of the Committee, Minutes of Evidence, and Appendices. Sydney, 1886.

An Act to provide for the Protection of Children. (Assented to 31st March, 1892.)

The Government Statistician's Report on the Vital Statistics of Sydney and Suburbs for the month of January, 1892, with Appendix for the year 1891. Sydney, 1892.

Statistical Register for 1890 and previous years. Part VIII. Vital Statistics; by T. A. Coghlan, Assoc. M. Inst. C.E., Government Statistician. Sydney, 1892.

The Wealth and Progress of New South Wales; by T. A. Coghlan. Sydney, 1889.

APPENDIX B.

SCHEDULE C.

No.	District	Date
Address of Lying-in home.....		
Name of woman		
Age		
Date of woman's admission		
Date of confinement		
Name of medical attendant or midwife		

(Signature of Registrar

For District of

.)

Diseases of Samoa.

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SAMOA is the native name of the group of islands in Central Polynesia, long known as the "Navigator's Islands." These islands lie to the N. and N.E. of the Tongan and Fiji Groups, lat. $13^{\circ} 30'$ to $14^{\circ} 20'$ S., and between 168 and 173 west longitude. They are of volcanic formation, and to the tops of the highest mountains, 3,000 to 4,400 feet high, they are luxuriantly clothed with tropical vegetation. The inhabitants, who are of the brown Malayo-Polynesian family, number some 34,000, and generally they are tall and muscularly well developed. With very few exceptions their villages lie close to the beach. Not far inland from their houses, sometimes not a hundred yards distant, there is low-lying and swampy land. They sleep, too, on mats on a floor formed of loose stones, and raised but a few inches from the ground. Consequently it is easy to discover the etiology of the ailments. The male population, when at home, spend the greater part of their time in fishing, with the sun almost vertical above them in the day, or at night with heavy dews falling. The females engage in domestic duties, or in making native cloth from the inner bark of the paper mulberry. The average temperature in these islands is 80° . The mountains, covered with forest trees and abundant undergrowth, give us a copious supply of rain, especially between December and March. Samoa is therefore a hot and humid climate, as well as specially trying to foreign residents. To ladies it is particularly trying. From internal dissensions, fermented by external influences, wars have been frequent during the past twenty-five-and-a-half years, the period I have been on the mission staff here. Using foreign weapons, these wars have been more destructive than in the club period. But the evil results have been more evident in deteriorated constitutions, brought about through sleeping in damp places and from having an irregular supply of island food. My own mission district, comprising 5,000 of the inhabitants of Samoa, may be regarded as a good type of the entire group. There is a tendency to a slight decrease in the population. Returns furnished me by the native ministers have, during the past two years, given a slight preponderance of deaths over births. The natives, as a rule, are not prolific. Their ministers being educated much above the average Samoan, know how to take better care of themselves than others, and as a rule they have a more numerous offspring. A white man with a native wife is rarely childless. In attempting a brief account of the diseases of Samoa, I may mention that of foreign diseases, neither measles nor small-pox has ever reached this group. A year or two ago there were two cases of leprosy, both Chinese. I saw a suspected case of a Sandwich Islander. The first missionaries say that the old Samoans informed them that influenza was brought by ships. Whooping-cough first appeared in 1849, and there have been epidemics, say, once in seven or eight years since. Tinea desquamans, or Tokelau ringworm, was introduced from other islands to the N.W. some twenty years ago, but is not common, nor is it increasing. Gonorrhœa and syphilis (recently) have been introduced, but are principally seen in those living in or going frequently to the harbour of

Apia. Having had the superintendence of a large district, there has not been time to record the many thousands of ailments treated since I returned as a qualified medical missionary two years ago. An analysis, however, of 1,113 recorded cases treated by myself at the Samoan Medical Mission Dispensary will be found at the end of this paper. First the

MEDICAL CASES.

Respiratory affections stand highest in the list, and if there were added to these the many cases, too numerous to record, which took often from seven to eight hours a day to attend to during the epidemic of *la grippe*, or true influenza, at the close of last year, then the number of these affections would be considerably increased. Some twenty-seven cases of pulmonary phthisis, and a few of these had the larynx principally affected, are on my record. Acute not as common as chronic bronchitis. Few have emphysema, and not many suffer from spasmodic asthma. So-called influenza is very common. Respecting the epidemic in November and December, 1891, I wrote this brief account, which was published in *British Medical Journal* of February 13th, p. 356. It bore the date of January 4th:—"It may interest your readers to know that in this group we have just recovered from a severe epidemic of influenza, or *la grippe*. At the present time there is very frequent steam communication between Sydney, New Zealand, and this group. It was not until influenza had appeared in Sydney that any cases were seen here. The epidemic began at the harbour of Apia, and from thence radiated to other parts of these islands. Symptoms exactly resembled those of the epidemic in New South Wales and Victoria, as well as Europe. A good number of natives and a few foreign residents have died. In the hundreds of cases occurring in natives, and in a few foreigners (with one exception) whom I have treated, all have recovered. Not so with others. The proportion of deaths occurring among Samoans, who trusted to their very imperfect herbal remedies, was as follows:—10 deaths out of an entire population of 600 or 700 in one village, and in others 4 and 5 out of a population of 160 and 500 respectively. So-called influenza is a very common affection in the South Sea Islands, but the recent epidemic was unique, and spoken of by the natives as a calamity as well as a new disease. The high temperature, the marked anorexia, the great prostration, followed by pleurisy, pneumonia, and bronchitis, and also in many cases diarrhoea and vomiting, gave distinct features to this recent epidemic. . . . The infectious character of this influenza seems to have been established by its course in this group. Nearly the entire population of villages have been prostrated, and in many families of Samoans so many have been prostrate as to be unable to get their native meals prepared."

Since writing the above, I have had more distinct evidence. A Samoan came from Sydney with influenza. Where he first stayed at, the west end of the harbour, the epidemic first appeared, and it followed in his track at every place he called till he reached his home, more than 80 miles west of Apia harbour.

Diseases of the circulatory system are few, and most of them anæmic. Three or four gave evidence of valvular disease, a few more of cardiac hypertrophy. The digestive system, in point of fact, furnishes a great number of cases. A feast to-day—almost a fast to-morrow. Irregularity of hours for taking meals, as well as in quantity and quality of food taken, make these people so very dyspeptic. Some enlargement of liver is not infrequent, and I have had one case of liver abscess: pyrosis and colic, diarrhoea and constipation, exceedingly common. I have seen a few cases of ascites, and

one of anasarca. Nervous system rarely affected. A few cases of epilepsy, three of facial paralysis, and one of third nerve, and one with most of the symptoms of glosso-labio-laryngeal paralysis are on my record. Neuralgia is met with pretty often. Skin affections abundant, especially eczema, frambæsia, and ringworm of the body. Tinea desquamans rarely met with. In general diseases chronic rheumatism is prominent; not so, acute rheumatism.

SURGICAL CASES.

Ulcers are top of list, and of the cedematous, callous, and indolent kind. They yield to treatment, some of them very quickly. Next to ulcers, elephantiasis is daily seen. Not a tithe of those who came during the stage of elephantoid fever have been registered. In twenty-five out of forty-eight recorded cases the scrotum was attacked. I have often had to tap for hydrocele, and obtained large quantities of fluid. Ten recorded cases give the inferior extremities as the seat of inflammation. During the puerperium the mammæ often suffer from elephantiasis, and abscess the result. Eye affections exceedingly common, *i.e.*, conjunctivitis and pterygium, single, double, and even quadruple. Out of seventy-seven recorded cases I have had eight cases of cataract. Next in frequency are abscesses; multiple abscesses are every-day occurrences; occasionally a chronic abscess presents. Scrofulous glands on neck, axilla, &c., are often seen, and Samoans in many cases have Shuman's diathesis. Pharyngitis, especially of a chronic kind, gives a number of cases. Wounds and injuries are usually caused by quarrels, or bites of fish. I have had cases of depressed fracture of right parietal bone, with marked symptoms of compression—a penetrating wound of chest and abdomen, caused by thrusts with a sharpened ramrod. These, and a number of others, all received in quarrels. Osteitis is not rare, and so, also, cases of diseased bone. Three cases of hip-joint disease are on my list.

AILMENTS OF CHILDREN.

In addition to those common to adults are especially intestinal worms. No salt is taken with food. Convulsions, very rare. I had one case of constipation in a child, when eleven days would pass without a motion. Conjunctivitis and otorrhœa daily met with in children.

DISEASES OF WOMEN.

As a rule labors present little difficulty, but are not infrequently tedious owing to rigid cervix. Retained placenta, not rare. One woman brought to me had complete prolapse of vagina. The midwife thought she had to deal with a placenta of a second child, and had evidently been using traction with serious results. Woman soon got ease after coming here, and has quite recovered. It is a mistake to imagine that women of these islands pass the puerperal period with immunity from ailments. On the contrary, they often look upon it as the period when serious illnesses began. I have had quite a number of cases of pelvic cellulitis, &c.

Amenorrhœa stands at the head of the list of women's diseases; next, menorrhagia. Dysmenorrhœa and dyspareunia, met with. I have also seen a few cases of abdominal tumours. During the nursing period the most frequent trouble is elephantiasis of the mamma. The subjects of it, as a rule, have weakly infants.

To close this very imperfect summary of diseases of the natives of these islands, I may mention that an intelligent and observant chief, on my return, remarked that there were *two* diseases in Samoa requiring a doctor, *viz.*, elephantiasis and *Tootala*. *Tootala* is the native word used to designate

dyspepsia, as well as the "diseases of women in connection with child-bearing." Europeans suffer from elephantiasis, but the hypertrophy is not so marked. The remark of the Samoan chief is perfectly correct. Next to the two, or, rather, three, affections mentioned by him, respiratory affections, ulcers, and eye-diseases should be named.

At the beginning of this paper I stated that there is a slight tendency to a decrease in population. The most fruitful cause of this has been war. They do not marry their cousins, for they treat their cousins as sisters, and call them by that name. But better blood might make them more prolific, as is seen when a white man marries a native. Other causes to keep down population have been in operation before the introduction of Christianity. There were fewer people in these islands when missionaries first came than there are to-day. Neither clothing nor drink can be brought forward to account for the stationary character of the population. A good and strong Government, with laws wisely and humanely administered, would do much to bring an increase of population in these lovely islands.

ANALYSIS OF 1,133 RECORDED CASES.

<i>Medical.</i>							
Diseases of Respiratory System	...	...	...	...	...	...	228
" Circulatory	"	...	...	...	...	...	20
" Digestive	"	...	...	...	...	...	174
" Nervous	"	...	...	...	...	...	15
" Skin	"	...	...	...	...	...	46
" Urinary	"	...	...	...	...	...	8
General Diseases	...	...	...	...	...	...	86
							577
<i>Surgery.</i>							
These include Ulcers	...	...	...	...	...	...	123
Eye Diseases	...	...	...	...	...	...	77
Elephantiasis	...	...	...	...	...	...	48
Struma	...	...	...	...	...	...	27
Ear	...	...	...	...	...	...	20
Pharynx	...	...	...	...	...	...	14
Larynx	...	...	...	...	...	...	1
Naso-pharynx	...	...	...	...	...	...	5
Lupus	...	...	...	...	...	...	8
Gonorrhœa	...	...	...	...	...	...	5
Wounds and Injuries	...	...	...	...	...	...	17
[Potts' Curvature	...	...	...	...	...	...	6
Hernia	...	...	...	...	...	...	6
							411
<i>Diseases of Children.</i>							
Intestinal Worms	...	...	...	...	...	...	40
Disordered Bowels	...	...	...	...	...	...	23
Marasmus	...	...	...	...	...	...	5
							71

Exclusive of Eye affections, &c., included above.

<i>Diseases of Women and Labour Cases, &c.</i>							
Vomiting of Pregnancy	...	...	...	...	...	...	5
Abortion	...	...	...	...	...	...	4
Labour at full term	...	...	...	...	...	...	13
Amenorrhœa	...	...	...	...	...	...	19
Menorrhagia	...	...	...	...	...	...	9
Dysmenorrhœa	...	...	...	...	...	...	5
Deficiency of Milk	...	...	...	...	...	...	3
Abdominal Tumours	...	...	...	...	...	...	2
Puerperium	...	...	...	...	...	...	11
							74
							1,133

The Meteorological Aspect of Typhoid Fever.

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IN a paper on the Etiology of Typhoid Fever, read at the Congress in Melbourne in January, 1889, the following position was advanced on the effect of temperature, that:—"The contagion of typhoid grows outside the human body, the controlling condition being a temperature of from 70° to 104° F." Statistics of the neighbouring colonies fully support this position based on those of Victoria. In all of the colonies the typhoid curve shows the same general contour, yet each has its individuality, and when placed against its corresponding curve of temperature even the minor shades of difference are apparent, showing the close dependency of the one on the other. So soon as the mean temperature of the air rises 2° or 3° above or falls below 60° F., typhoid rises or falls. In Sydney, where the heat is more prolonged and the winter milder, the typhoid curve begins to ascend two months earlier than in Melbourne and Hobart, while Adelaide holds the position between. In Adelaide the heat from December to March is greater than in Sydney, but less for the remainder of the year. In all the Colonies the fall is rapid in June, but at Melbourne and Hobart it begins gradually in April, at Adelaide in May, and at Sydney in June, as seen from the following:—

Diagram of the Range of Typhoid.

	Ascent.	Descent.	Period of Prevalence.	Period of Non-prevalence.
Sydney	October	June	October to May...	June to September.
Adelaide	November	May	November to May	June to October.
Melbourne	December	April	December to May	June to November.
Hobart	December.....	April	December to May	June to November.

Thus the curves for temperature and typhoid constantly coincide, and it is a strange coincidence indeed if it is not a law. But there is another atmospheric condition of as much importance as the temperature yet intimately connected with it, viz., ozone. From the beginning of summer to the middle of autumn it is at a minimum, then ascends to its maximum in the first month of spring, and falls more rapidly than it rose. Its curve is thus inverse to those of temperature and typhoid, its minimum corresponds with their maximum, its ascent with their descent, its maximum with their minimum, and its descent with their ascent. And here the difference between the warmer and cooler climates holds good, for at Adelaide the maximum is reached a month earlier than at Melbourne. Thus the relationship existing between the atmospheric conditions and the prevalence of typhoid is manifest and constant. To which of these conditions is the increase or decrease attributable? Both are operative, but the temperature appears to control the ozone, at least to a certain extent. The period of prevalence of typhoid is characterised by a high temperature, a minimum of ozone, decay in vegetation, and active decomposition of

organic matter; the period of non-prevalence, by a low temperature, a maximum of ozone, great activity of vegetation, and slow decomposition of organic matters. The group of anaërobes to which the bacillus of typhoid belongs grow and multiply only at high temperature, fermentative activity greatly favours their growth, and they flourish in alkaline media, while low temperature, excess of oxygen, and acid media arrest their growth and multiplication. The conditions, then, that favour or arrest the prevalence of typhoid are the same that favour or arrest the growth of the bacillus. The temperature, then, is the controlling condition of the increase, the ozone that of the decrease, for in hot seasons when ozone is in excess typhoid prevalence is low.

A Paper on Public Health.

ANDREW ROSS, M.D. Ch. M., Glas.

IN this paper Dr. Ross pointed out the pressing need which exists for a Public Health Act in New South Wales. He drew attention to the adulteration of butter and of tea, and to the evils resulting from open gutters, overcrowded dwellings, ill-ventilated and filthy lanes and alleys, stagnant polluted water, &c. He emphasised these facts by allusion to the increasing death-rate of the suburbs as compared with that of Sydney. He pointed out the good service which may be rendered by the Congress in stimulating the Government to action in these matters.

An Inquiry into the Cause of Influenza and the Course of the Pandemic Wave in 1890.

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THE modern text books give but a poor description of influenza; one has to turn to those of half a century ago to learn its possibilities and the various forms it assumes. The pandemic of 1890 came as a new education, and its lessons are not likely to be soon forgotten.

Influenza occurs in Victoria in every month of the year, but has its special periods of prevalence, viz., from April to October with a lull in June and July, in other words an autumnal and vernal prevalence. The predominant form in autumn is the gastro-intestinal, and in Spring the catarrhal and pulmonary; the spring prevalence is generally the most marked and prolonged. This periodicity suggests a seasonal cause.

From the mild character of the disease during the last thirty years—1885-6 excepted—doubts have arisen as to its identity with pandemic influenza, and by way of distinguishing this, the ordinary, from that, the extraordinary, it has been called epidemic catarrh, fog fever, shearing-shed fever, or shearers' catarrh, &c. The difference, however, is of degree not of kind, and these synonyms convey nothing more. The valuable report submitted to the Board of Health in Sydney in December, 1890, by Dr. Ashburton Thompson amply illustrates this. An interesting side-light is thrown on this point in Appendix VII of that report. Doctors Colpe and Lyttleton, residing six hundred miles apart, note with evident surprise the absence "for the first time" of the "shearers' catarrh" and "fog fever" in their districts in 1890, the pandemic year. The fact is significant. The name fog fever first became popular in Victoria, during the epidemic which overspread Australasia, New Zealand, New Caledonia, Fiji, and Polynesia in 1885. The features of that epidemic have been well recorded by Dr. Springthorpe, of Melbourne, in the October number of the *Australian Medical Journal* of 1885, and by Mr. Jay, of Adelaide, in the *Australasian Medical Gazette* for April, 1886. Dr. Springthorpe further elaborated his views in a paper of exceptional merit read at the last meeting of Congress in 1889, under the heading "The Nervous Substratum of Influenza." These papers indisputably prove the identity of the epidemic fog fever of 1885 with the pandemic influenza of 1890, and also with the mild influenza of ordinary years. Thus, influenza may be pandemic, epidemic, or mildly prevalent. The argument from analogy is unnecessary; but it is a fact that other diseases vary in intensity from the most malignant to the most benign, in different periods of years, and why not influenza?

MEANS OF SPREAD.

Medical opinion has always been divided on the question of contagion. Owing to recent advances in science the contagionists have greatly increased in number, and many hold that contagion is the chief if not the only means by which influenza is propagated. Space forbids discussion of the argu-

ments *pro* and *con*; one may be alluded to, as it appears to be regarded as unanswerable by those who hold the contagion theory. It is often said that "influenza does not travel faster than man," the truth is, *it does not travel so fast*; had it kept pace with railway and steamer it would have been round the world in half the time it took. Admitting it to be contagious, the existence of a few scattered cases for a week or two previous to an outbreak could hardly account for the sudden epidemicity in man and beast, in town and country, within a few days. Something more powerfully diffusive is at work, and what more so than the air we breathe? The contagion of influenza is air-borne, and this will appear more clearly from its

MODE OF SPREAD

Which is two-fold: First, in a wave passing from east to west, and second, by extension laterally from that wave north and south. These two modes differ essentially in the manner, rate, and incidence of their spread. The wave may have a northerly or southerly trend, but the main direction westward is always maintained; it travels quicker over the sea than over the land, yet at a measured pace, arriving at the different stations along the line as if arranged by time-table, and epidemicity in its course is sudden. The spread laterally is slower to the north, especially the north-east, more irregular in its incidence, and epidemicity is more gradual. These characteristic features will be observed in following the course of the pandemic. To avoid confusion, the dates at which influenza became epidemic at different places are those employed in describing the course, of which a bird's-eye view is given in the map. Dunedin, N.Z., was the first city in this part of the world at which the great pandemic of 1890 made its appearance; it was epidemic there in the week ending 8th March. Christchurch was in the wave, and Wellington on the border; the direction was west with a northerly trend, and on 25th March it reached Hobart, on the 27th Melbourne, and on 30th Sydney, on 15th April Adelaide, in the end of May Perth, W.A. Following the line west and north it reached the island of Rodrigue in July, Mauritius in August, Madagascar in September, and Blantyre, in the Shire Highlands of South Africa in the end of September and beginning of October, where the wave mingled with the lateral streams flowing south from Alexandria and north from Cape Town.

To return to Australia. Unfortunately there is but one official report published, that of Dr. Ashburton Thompson, formerly referred to. From that report we learn that influenza "was distinctly, but not severely, felt in Sydney," and the map shows that while the disease was reported from thirty-two towns to the south and west of Sydney in March and April, it was only reported from ten towns to the north of the capital. Sydney was thus only on the border of the wave, the centre of which crossed Victoria westward, where the disease was severely felt, as well as in South and Western Australia. How did influenza reach Dunedin? It was supposed to have done so *via* San Francisco. That was a mistake. The Californian mail was delivered at Dunedin on 5th March, influenza was epidemic by the 8th, having been preceded by scattered cases for a fortnight before, and the first case in the Post Office occurred in the end of March. The epidemic did not begin in Auckland till the 9th May, where, if imported, it ought to have shown itself sooner than at Dunedin; nor did it occur in Fiji or Samoa on the Californian route till October, 1891. Influenza did not reach Dunedin from the north nor from the south, it went west; therefore it must have come from the east, and following the line eastward we find it epidemic at

Valparaiso on the west coast, and Buenos Ayres and Monte Video on the east coast of South America in the end of January, and eastward still at Cape Town, South Africa, in the beginning of January, 1890. Thus, from Cape Town, in Africa, to Perth, in Western Australia, there is an unbroken line of about 14,000 miles, and influenza epidemic all along the line in regular succession, travelling quicker over the sea, slower over the land, with a southerly trend from the Cape to Dunedin, and a northerly trend thence to Perth, but the main course westward steadily maintained.

The slower rate and irregular course of the extension laterally is seen from the fact that the epidemic only appeared in Auckland in May and Queensland in June, two months after it broke out in the South. In South America, too, the epidemic only reached Callao and Pernambuco in April from Valparaiso and Buenos Ayres. That the epidemic did not reach Cape Town from the north is evident, for it was there as soon, or sooner, than it appeared at Alexandria, and at the same time that it appeared in England; consequently the idea of its importation by steamers is out of the question. It must, therefore, be concluded that the pandemic wave which has been traced 14,000 miles west from the Cape with a southerly trend arrived there from the north-east. The wave appears just to have skirted the Cape, for influenza did not appear till later on east of Cape Town, and as the disease was not reported from Northern Australia the trend was probably more northerly, and it either crossed the eastern peninsula or to the south of it from the China Sea, for at Hong Kong in September and October, 1888, an epidemic prevailed, unrecognised at the time, lasting for about two months, the usual duration of an epidemic of influenza, and having all the characteristic features of that disease, as since recorded by Mr. Cantlie, of Hong Kong, in the *B.M.J.* for August 29, 1891. So that here in China was probably, at least, the origin of the pandemic.

We learn from Mr. Cantlie's interesting paper that it was only after the pandemic wave had crossed from America to Japan and thence to China that medical men recognized in influenza the same disease they were familiar with under a variety of names, such as dengue, German measles, fever with catarrh, and rheumatism with fever. These names indicate clearly enough the similarity. From the name "Chinese influenza," given to it by the Russians, it would appear they share Mr. Cantlie's opinion that influenza is endemic in China. The question is most interesting from many points of view. The two empires meet in Central Asia, and there is a large caravan trade between them. It may, therefore, be supposed that epidemic diseases would have free interchange. Be this as it may. The probability that the pandemic which has been traced in the Southern Hemisphere originated in China is strengthened by observing its course in the Northern Hemisphere. The first recorded appearance of the influenza in Russian territory, in 1889, was at the important town of Bokhara, in Central Asia. There an epidemic broke out suddenly in the end of May and continued to the end of July, causing great mortality among the native population and much suffering to the European. The epidemic must either have originated there or come from somewhere else. From the suddenness of the outbreak, and that when next heard of influenza was a thousand miles to the north-west, the probability is that it came from the south-east, that is from China. Influenza is next heard of as epidemic in the province of Ufa, in Astrakhan, in Russia, in Europe, and at Tomsk, in Siberia, where it was widespread by October 15th. The speed at which the pandemic wave travelled at first was slow; it was over the land, and the high mountain ranges stretching from the east of China to Central Asia doubtless hindered its progress. It is noteworthy that

from the end of the epidemic in Hong Kong to the beginning of that at Bokhara a period of seven months elapsed, and from the end of the epidemic at Bokhara to its commencement in Ufa two and a half months; the distance from Hong Kong to Bokhara is 3,000 and from Bokhara to Ufa 1,000 miles. The rate of speed hitherto was the same, henceforward it was greatly accelerated. The trend of the wave from Bokhara, in latitude 40° north, was northerly. From Siberia and Ufa the wave passed across the central provinces of Russia, between the 54th and 60th parallels of north latitude, and between the 1st and 15th of November the epidemic had broken out from Kaluga to St. Petersburg, and as far west as Wilna and Riga, in longitude 24° east. The centre of the wave seems to have been south of St. Petersburg, and the trend changed to south-west, for influenza was epidemic in Berlin, latitude 52° north, and Paris, 49° north, in the last days of November, while in Sweden it was not till the second week in December, and in Norway till the fourth week. From Paris the wave crossed the Atlantic, and arrived at New York, latitude 41° north, on 17th December, where influenza was epidemic on the 26th. By 5th January, 1890, it had reached the West Coast of North America, and was widely epidemic throughout the United States in the fortnight following. From America the wave crossed to Japan, where the epidemic began in February, and crossed to Tient Sin, in China, April, 1890.

What appears to be more than a coincidence is the date at which influenza became epidemic on the West Coast of South and North America. At Valparaiso, South America, it was epidemic in the end of January, 1890, in California a week or two earlier; the distance from Hong Kong to the former is 500 miles greater than to the latter. The slower progress by extension laterally from the wave is seen in all parts of the world as indicated in the map. Thus in Europe, to the north of Berlin, influenza became epidemic in Denmark, Sweden, and Norway from the 10th to the 28th December; on the South Coast of England on 15th December; in London and the East Coast in the end of December and beginning of January; and in Ireland on the 11th of January. To the south of the wave the dates of epidemicity are progressively later in December the farther south you go, and it was the beginning of January before the epidemic appeared on the north of Africa, from Algiers to Alexandria. Reference to the map shows that in America, North and South, the progress was the same, and in marked contrast to the rapidity with which the wave traversed the continent from east to west. May it not be that these essentially different modes of the spread account, to an extent, at least, for the diametrically opposite views held by different observers, according as their observations were made in the line of the wave or outside of it; and, further, that the difference in the severity of the epidemic in different countries depended on the same cause? Thus in Victoria, which was in the wave, the epidemic was severely felt, while in New South Wales, which was outside the wave, it was not. Dr. Parsons, in his admirable report to the Local Government Board, speaks of the "lightness with which England suffered as compared with some continental countries." England was outside the wave.

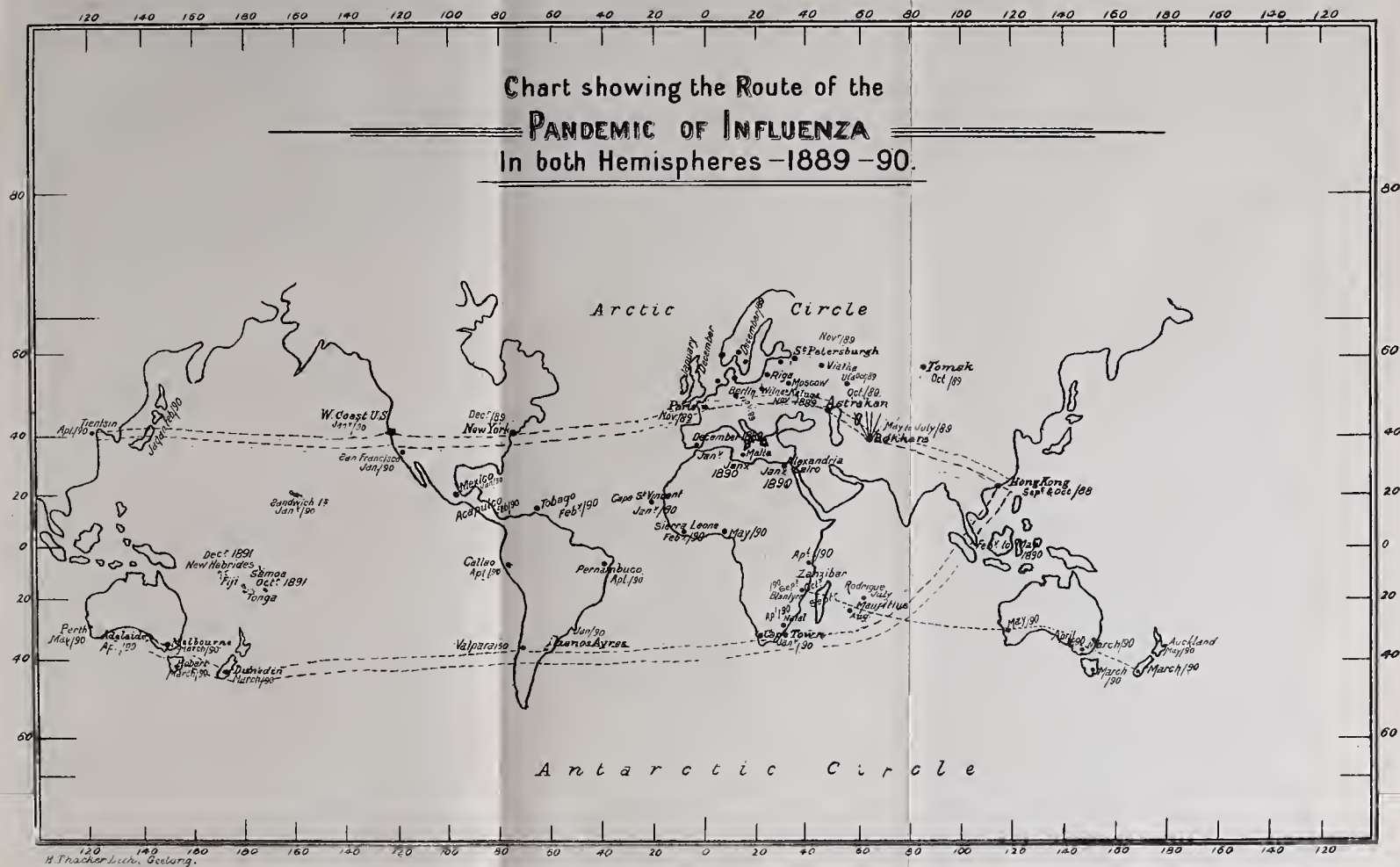
THE CAUSE OF INFLUENZA.

The features of the disease, and the knowledge that others of the miasmatic class are caused by living organisms, naturally led to the hypothesis that influenza too was caused by a micro-organism, and it would appear that the labours of bacteriologists have been rewarded by its discovery and isolation by Pfeiffer. Assuming this to be correct, and pending the results of

investigation as to the characteristics of the bacillus, we are limited to the observation of the phenomena of influenza. The first effect of its epidemic prevalence in this district was the immediate subsidence of typhoid fever and diphtheria, which were both very rife at the time. An occurrence so striking could hardly be local, and inquiry resulted in ascertaining that, in regard to typhoid fever, the same sudden arrest of prevalence occurred in the hospitals of Melbourne, Hobart, and Launceston. In Tasmania and Victoria typhoid fever begins to decline gradually in April and suddenly subsides in June, but in 1890 this sudden subsidence took place in April, two months earlier than usual. This occurrence, perfectly unique, was coincident with the advent of the pandemic of influenza. Space forbids further details. Inquiry led to the discovery of the fact, which appears to have the authority of law, that during the epidemic prevalence of influenza the mortality from—hence prevalence of—diarrhœal diseases, typhoid fever, diphtheria, &c., is greatly diminished, while, on the other hand, that from diseases of the lungs, heart, and nervous system, &c., is greatly increased. Influenza has never been entirely absent since the end of March, 1890, and has been epidemic in autumn and spring ever since, and the former diseases have continuously decreased while the latter have increased. It is, therefore, obvious that the influenzal prevalence, while increasing that of certain diseases, is antagonistic to that of certain others. They group themselves into two classes. This is further illustrated by the seasonal prevalence of these diseases in ordinary years. Diarrhœal diseases, &c., begin in October and commence to decline in April; influenza begins in April and declines in October. Thus the period for the rise of the one is that for the fall of the other, and *vice versa*. A further fact of interest is that from October, when diarrhœal diseases begin, to June, when they cease, the predominant form of influenza is the gastro-intestinal. The antagonism thus seen to obtain between these diseases, and their seasonal prevalence at opposite periods of the year, points to some general cause acting upon each, at one time favorably, at another unfavorably. The connection with season shows this condition to be atmospheric.

It has been observed that in non-electric conditions of the air cholera and diseases of a low type prevail, and rapidly subside when the air becomes charged with positive electricity. It has been shown above that diarrhœal diseases, &c., rapidly subside when influenza is epidemic; the advent of influenza and that of an excess of positive electricity thus produce the same effect, and in regard to the subsidence of diarrhœal diseases stand in the position of cause. When the air is charged with positive electricity, ozone is in excess. From the ozone registers for twenty years of Messrs. Todd and Ellery, the Government Astronomers at Adelaide and Melbourne, the ozone and temperature curves are seen to be complementary, the amount of ozone diminishing with the rise of temperature and increasing with its decline. The maximum of ozone in the former city is in August, in the latter in September, as might be expected from their different latitudes, the fall is gradual and progressive. The minimum is from December to March. The rise takes place in April—the rise of ozone and the fall of temperature coinciding with the decline of diarrhœal diseases and typhoid on the one hand, and the commencement of influenzal diseases on the other. Observing that ozone, when inhaled, caused intense headache, coryza, catarrh, and pulmonary congestion, Schönbein advanced the hypothesis that it was the cause of influenza. These are symptoms of influenza, but on the assumption started with, that Pfeiffer's bacillus was the cause, there cannot be two efficient causes, and a gas cannot evolve an organism; but, from what has

Chart showing the Route of the **PANDEMIC OF INFLUENZA** In both Hemispheres - 1889 - 90.



been advanced above, there is clearly an intimate relationship between the amount of ozone in the air and the prevalence of influenza, the increase being followed by a greater prevalence, the decrease by a lesser. Therefore ozone stands to influenza as its controlling condition, an excess increasing a deficiency diminishing it; hence the action of ozone on the bacillus is quickening, vivifying, just what might be expected in an aerobic bacillus, which Pfoiffer tells us is very susceptible to desiccation, killed by a temperature of 60° C. and by chloroform—a bacillus which revels in a cool, keen, pure air, hence its activity in the colder months of the year, when ozone is abundant. The opposite effect on the typhoid and other bacilli is suggestive, but cannot be touched now. In conclusion, the hypothesis based on the above phenomena is that the wave was a wave of ozone, and quickened the bacilli everywhere present into great activity; hence influenza was most severely felt in the time of the wave, and less so outside of it.

Sewers and no Sewers.—Experiences in the Eastern Suburbs of Sydney.

F. H. QUARF, M.D., CH.M., Glas.

THE dwellings in the Eastern Suburbs are built on sites formed by long ridges, comparatively narrow on their tops, their sides sloping considerably and often very sharply to their bases. One of these runs out eastward as far as Waverley, and then joins a cross ridge, which runs mainly north and south from the harbour at Point Piper to Botany by Randwick. Another large spur forms Darling Point, running out into the harbour between Rushentter and Double Bays. Smaller spurs run out from the eastern ridge to the sea. Between all these ridges and other minor ones on the south are flat valleys only raised a few feet above the sea-level. The high lands attain a height in places of 250 feet or more. The flats are sandy, and are on the north the heads of the bays silted up long ago, while on the south there is a long broad valley stretching out from Paddington and Woollahra to Botany Bay, and bounded on the east by Waverley and Randwick Heights. In this are located the Centennial Park, Randwick Racecourse, Moore Park, and other notable reserves.

The hills are composed of a basis of ferruginous sandstone full of fissures, covered in places by shale or ironstone, or white clay, but mostly, and especially nearer the sea, by enormous masses of sand, yellow, compact and firm below, while sharp and loose above and easily blown about by the wind, probably of the nature of dunes such as may be seen at Bondi Bay constantly being formed by the wind blowing over the ocean beaches. This sand is of great depth in many places, and in many is very shallow, a mere film over the sandstone rock, as in some parts of Waverley. The hills are full of water in wet seasons, draining out into small creeks in the valleys, saturating the sandy and peaty flats, so that large supplies of wholesome water were obtained from numerous wells in the slopes and flats before the population became so thick as to cause pollution. Indeed, the southern large flat mentioned above furnished the water supply for the city for many years, and stood out many a drought. It can even now be drawn on in case of any serious accident to the magnificent works recently constructed. But as population has spread round the Waverley and Randwick Heights, foul drainage has sprung up and increased, and renders it necessary to depend very little on this source. Indeed, at the bottom of Birrell-street, Waverley, there was only a few months ago, and I daresay it is there yet, a stream of filthy slops, exhaling a noisome stench, well worthy the attention of our Health Board. This runs into the highest dam in Centennial Park, and into a pond above it, which forms a favorite bathing-place for the youth of the neighborhood in summer. All this filth soaks through into the water of the Park, and must eventually find its way into the Botany dams. Further, this pond is the resort of dogs, which drink it and swim in it, so that there is the danger of ova-producing hydatids being carried along. This part of Waverley is not yet provided with sewers, but should soon be so; and then I hope the Board's inspectors will see that this filthy and dangerous stream is cut off. Within the last

twenty years the density of the population in these areas has enormously increased. At the beginning of that period the more dense and connected portions followed the old-established roads and only here and there left them, especially where the choice sites near the harbour or the sea attracted settlement. Now the population is planted thickly and widely, and new streets, closely built, run in all directions. Mostly these occupy the ridges and slopes, the most notable exception being the long-settled village on the flat forming the southern shore of Double Bay. It is, in my opinion, of extreme sanitary importance that all these flats should be preserved for either gardens or parks, and not built upon, as their drainage is only to be accomplished by expensive pumping schemes, while they, if kept open, form excellent lungs for the neighbourhood around them, besides which they would make excellent and highly ornamental public recreation grounds. At present much of the land is let to market gardeners, who pay as much as £10 per acre per annum of rent.

Twenty years ago the cesspit was in almost universal use, and too often it was only a hole in the earth or rock, or, if built of brick, was badly or not at all cemented; cement, however, not forming a barrier impervious to sewage. In the more pervious soils (and, taking the districts generally, from what I have said you will see that most of our soil is pervious) the contents oozed through the walls and bottom, and contaminated the ground for many feet around and below. On many of the larger properties a water-closet system was introduced, which discharged into a large pit in the ground. In many of these the top and sides only were properly built, and the bare sand left for a bottom, so that the fluid part of the sewage soaked away through the sand or earth till it came to a more impervious layer, where it spread and ran along the nearest incline till it came to the surface or soaked into wells, and even underground tanks. At that time the only water supply was from the rainfall on the roofs, or from wells, some of great depth. As cesspits increased in number, the soil was more and more contaminated, and the reeking fumes from the fermenting masses charged the air round them, and much of it was blown into the houses, sometimes accompanied by typhoid germs from unsuspected cases using the closets, either directly or indirectly. Where a pit was found to fill up quickly, actually a pipe was laid into the nearest street gutter, till there was such an addition to the foulness of the gutters that an inspection traced out the cause, and the municipal authority compelled an alteration. In the closer-built streets, where proper gutters existed—there being no underground drains—all slops from kitchens and sinks and laundry tubs were necessarily led into these, and as there was no power to compel the owners to have the gutters made in front of their land, many gaps were left, in which much of the slops and rain-water from yards (not too clean) lay and decomposed till it either dried up or percolated into the soil, or was washed away by heavy rain to some lower level. Many of the water tanks were underground, generally well-built and cemented; but often there were cracks in them, and sewage could soak through. Some of the best had puddled clay outside. Often the cesspit was on a higher level than the tank or well. I know a place near the lower end of the barracks in Paddington where there was a well just in front of a house in a garden. Within a short distance up the hill, at the back, I counted sixteen cesspits, none of which were likely, at that time, to have been free from leakage. This well was a favourite in the locality, and enteric fever was seldom absent. In the lower parts the accumulated decomposing matters spread their mal-odours, especially in warm and moderately dry weather, across the streets and into the windows of the

houses, opened for the sake of air, and there can be no doubt that filth disease was spread about in this way. In walking down the streets, one could only get partially clear of the stench by steering a course down the middle of the roadway. The cesspits—as above explained—ill-constructed, and often irregularly emptied, added their quota to the danger and disgusting smells; while the night-carts, at midnight, patrolled the streets to fulfil their necessary but unpleasant duty, obliging the residents, just before retiring, to close up every window or opening of any kind to keep out the horror. This was a weekly nuisance. Many dairies existed in the districts, some in small yards, and most in a filthy and unwholesome state. There was no inspection because there was no power to interfere.

Many years after this, after an alarming epidemic of enteric fever in various suburbs, and in the city itself, the Legislature interfered and gave larger powers to the Boroughs, enabling them to regulate the construction of cesspits and to establish earth-closets instead. The introduction of a copious water supply also gave them much greater ability to flush out drains and gutters, and a better system of inspection and good by-laws enabled them in some parts to minimise these evils. But the real hope for the future lay in the adoption and completion of the splendid system of sewerage which is now in operation, and which is being extended to all the nearer suburbs as fast as money and the energetic action of the Roads Department and the Water and Sewerage Board will allow. Also, the introduction of the new and ample supply of water from the uncontaminable sources at the back of the Illawarra Mountains has been of untold benefit. In the extensive parts of these suburbs, where there are yet no sewers in operation, the faulty conditions above mentioned still exist (except the absence of water and the existence of better pits and the earth-closet system). But they are minimised to some extent by the quick absorption by the porous sandy soils which increases nearer to the sea-coast. During the time I have referred to several severe epidemics of diphtheria have occurred; and enteric fever may be said to have been endemic. Severe outbreaks of it almost always occurred in spring and autumn. In very dry seasons, with few but heavy showers, they were not so marked, nor in very wet ones, but a season of moderate drought with light showers was invariably attended with an increase of this disease. The showers probably stirred up the germs, but did not wash them away. Stormy seasons with heavy rainfall were always inimical to this disease. It is not my purpose to describe the system of sewerage which has been adopted in Sydney, but I may remind you that it is designed on the most modern sanitary principles. The sewers are properly constructed as to size and grade, so as to be self-cleansing, and the best methods of ventilation throughout from end to end are being applied, while new features of value are being introduced as quickly as they can be tested and found worthy of use. It is something over two years since the sewers began to come into operation in these districts, and at present nearly the whole of the Borough of Paddington is served; the exception being a part near the junction of Ocean-street and New South Head Road which will, I understand, drain into the Darling Point branch. Woollahra has its densest ward, Piper Ward, very nearly all connected, and parts of the borough eastward of that are now under notice and are being rapidly brought in. In Waverley, recently, large numbers of houses have been connected, but there is a great deal to do. It is intended to serve all the more compact parts of these suburbs. I believe the work pays nearly if not quite all the interest besides maintenance. It may be interesting to note that now in Paddington there are out of 3,600 houses only 150 cesspits left.

In Woollahra, out of 2,000 houses, there were, before the sewers, 814 cesspits; now there are only 149. Out of 1,201 earth-closets, there are now only 508. As our district is more scattered than Paddington, some of the above numbers will not diminish at the same rate. We are now able to put our by-law, relating to dirty gutters and yards, in force, and the Council, of which I have the honor to be a member, is animated by the fullest desire and purpose to diminish the evils above referred to as absolutely as the law will allow them to do. We are very strict in the supervision of dairies, and carry out the instructions of our friend, Dr. Ashburton Thompson, as closely as we can; while in the sewered parts of Woollahra you will have to hunt about for a good while to find a dirty gutter or a bad smell. There are one or two defects. The Acts do not give us power to enforce the proper paving of stables, so as to enable the Water and Sewerage Board to compel them to connect; but we can enforce our by-law preventing the discharge of foul matter into the lanes and streets. Nor are we in a position yet to compel owners to kerb and gutter their street frontages, but I am in hopes that the new Local Government Act (when we get it) will enable us to do so. Bearing in mind that we have had three or four rainy seasons—that is to say, unfavourable ones to fever—I am sure, from my own experience and that of my colleagues in our districts, that the effect of the introduction of our sewerage system has been to immensely lessen the prevalence of enteric fever, and even diphtheria; and I do look forward to the time when the metropolis of New South Wales shall be, by wise laws and vigorous administration in sanitary matters and in healthiness, worthy of the magnificent site upon which she stands, a model for the cities of the world to copy.

Leprosy in Queensland.

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IN submitting a short account of leprosy and allied diseases to your Congress, I must apologise for my inability to be present and benefit by the criticism my remarks call forth.

It is a matter for satisfaction that so few cases of leprosy have happened in Queensland to persons of European extraction, but there is good reason to conclude that, without measures are carried out to remove Asiatic and Polynesian lepers to a considerable distance from the residences of the colonists, the disease will spread amongst ourselves.

My arrival in the colony dates from 1866, when I was appointed a visiting-surgeon to the Brisbane Hospital, and shortly afterwards, 1868, I took charge, as resident surgeon, of the newly-built institution. At that time no medical man of the place was aware that he had seen a case of leprosy. The article in Erasmus Wilson's book on skin diseases was in our hands, but in no work accessible to the ordinary travelling practitioner was there a plate or drawing of leprosy in any of its forms. Danielssen and Boeck's book was out of print, and it was many years later that I had the opportunity of perusing that work in the library of the College of Surgeons, in London. The illustrations there are valuable, and it is much to be regretted that no medical author in England had reproduced the plates in the class-books of the day. Had such been the case, the English medical student would have been able to diagnose ordinary well-marked cases of leprosy with readiness. As an illustration of the defect referred to, see article in report of Polynesian diseases, by an M.B. of London, in Intercolonial Medical Congress of 1889, p. 63, with photograph of a Polynesian with necrosis of fingers and toe. Leprosy does not appear to have been suspected.

I found, on taking charge of the hospital, a patient, a German, who had been a ship's cook, and had resided for a considerable period in the Sandwich Islands. He was usefully employed about the premises, and had well-marked tubercles of the face, eyebrows, and ears, his voice was hoarse, and the hands and feet too were anæsthetic in parts, as he discovered by at times burning himself, and the nails of the fingers and toes were defective. His appearance was remarkable, and I often interrogated him as to syphilis, which he denied having suffered from. A course of mercury did him harm, and it was only after reading Wilson's description repeatedly that I concluded the patient was a leper. With great difficulty did I obtain the concurrence in this opinion of some of my colleagues. He died during my tenure of office from albuminuria and dropsy. On *post-mortem* examination I remember to have noticed white deposits in his liver. "A number of Polynesians, with ulcers of the feet and carious bones, I treated, and in the hospital case-books I entered them as "Islanders' toe-disease." After a time it dawned on me that these were also cases of leprosy. A large elastic tumour, mostly of the groin, was found in a number of patients; cases of chyluria were discovered, and filaria

were found associated with both these. My attention was turned from the few cases of leprosy that appeared, and I became of opinion that both the leprosy and filaria were associated diseases, brought here by the Chinese, and distributed by mosquitoes carrying the diseased blood to water-tanks and elsewhere. Numerous cases of filaria disease were found in the families of cottagers who had wells, open water-butts, and tanks. In one instance there were four children suffering from filaria in one family. This led to more careful exclusion of mosquitoes from water-tanks by metal gauze covers, and to the disuse of wells. Happily, now the large water-work pipes are well distributed, few young children are found with manifestations of filaria diseases.

My original paper on this subject is published in the Pathological Societies' Transactions, 1878, Vol. 29, p. 407. At the meeting at which this was read, I remember to have crossed swords somewhat with the president, Sir Erasmus Wilson, who called me to task for affirming that the term elephantiasis should be used for the big-leg disease only, and that elephantiasis græcorum, as applied to leprosy, should be abandoned. This has, practically, now come to pass.

My attention was drawn to a case of phalangeal necrosis, by Dr. Jno. Thomson, then house-surgeon, who considered the patient suffering from leprosy. The case is recorded in the *Lancet* of February 18, 1879. This patient had also embryonic filaria in his blood. He managed a boiling-down establishment in close proximity to Chinese vegetable gardens.

On reading over the old case-books of the Brisbane Hospital I became convinced that there were cases of leprosy, and possibly filaria diseases, among the records. I subjoin the history of one patient (1855), which seems most characteristic of leprosy. Neither the late Dr. Barton, who recorded it, nor his colleagues, appear to have had any suspicion that the case was leprosy.

HOSPITAL RECORDS.

Necrosis, &c.

Folio 258.—Oon Tsar, æt. 56, April 10, 1855. History.—Can speak very little English, and the history is imperfect. He has had some disease of the first toe of the left foot, it has been removed, and there is now an opening in the ball of the great toe of the same foot from which there is a slight fœtid discharge, and a probe detects loose bone. The last phalanx of the second finger of the right hand also is dead and separating, and the soft parts have sloughed away; he is weak, and seems broken down in health. April 20.—The diseased phalanx removed at the joint. June 7.—General health much improved, the diseased great toe removed by Dr. Cannan with three-fourths of its metatarsal bone, no vessels required to be tied at the time, and the wound was brought a little together by two sutures. At 7 p.m. some hæmorrhage occurred, which was restrained with bandage and compress.

August 8.—Discharged well; the foot has been slow in healing, the hospital has provided him with a padded boot, which acts as the ball of the toe did to support the foot.

Chronic Rheumatism.

Folio 417.—Admitted February 29, 1856. History.—This old Chinaman was in hospital in April–August (for history, *vide fol. 258*); he is now admitted, with pains chiefly in the hands, the fingers being contracted. March 6.—Left hospital without leave, having first assaulted the wardsmen; relieved.

Necrosis and Gangrene.

Folio 517.—Admitted December 18, 1856. History.—This old Chinaman has been in hospital twice before (*vide* 417–258); he is now admitted in a miserable state; the left foot is dark-coloured, hot, but without feeling; there is a very foetid discharge from the spot where the great toe was removed: the left hand is swollen, hot, dark-coloured and painful; he has a dry tongue; pulse over 100 with little volume; the left foot is wrapped in cotton at once. March 25.—A finger of left hand removed at his request, as the necrosed bone “too much stinky.” April 20.—A straight palmar splint applied to left forearm and hand to prevent flexion of the fingers. April 28.—Discontinue splint, the parts will not bear the pressure; left hospital without leave on November 17, 1857; incurable.

Folio 102.—Onn Tsar, *æt.* 59, February 3, 1859. History.—This old man, whose hands and feet are quite crippled by repeated attacks of necrosis and senile gangrene, has been a long time in hospital on several occasions; he left the last time a little more than a year ago, and is supposed to be living on the charity of his countrymen at Limestone ever since; he brings down the usual admission fee, given him by his friends; he is now unable to walk; there is a sore swelling about the dislocated left wrist. May 28.—Feet cold and insensible, vesicated and discharging a quantity of serum, the remains of right hand also inclined to vesicate; the nights of 22nd and 23rd were extremely cold; feet wrapped in cotton, flannel outside, and hot brandy and water *ad lib.* given him. May 30.—About the same; will not drink the brandy; weather warmer. June 29.—Died.

The first case was observed in New South Wales by Dr. Cox in 1872, so I see it is recorded.

Believing that leprosy might be commonly associated with filaria disease, I examined the blood of a large number of lepers in the Tang Toc Sing Hospital at Singapore. I examined the blood in the day-time, and with negative results. Manson has since shown that filaria rest in the day-time, but I have seldom much difficulty in extracting them by puncturing the lowest point of the lobe of the ear and pressing out the blood. Most likely this proceeding dislodges the worms from their resting-place. There is not much evidence of the association of filaria and leprosy, but in Japan it is on record that in one village, where water lies abundantly under the houses, leprosy, which is very common, often terminates the lives of the victims with associated elephantiasis. Why were both these diseases, elephant-leg and leprosy, by the old physicians called by the same name, if not associated diseases?

I should not omit to mention in this place that the filaria disease of the dog is most likely to have been imported from China. Fortunately, this terrible heart-stuffing worm has never been found in the human subject. I have put on record somewhere that the fly *Stomoxys* can take up plenty of embryos of this worm, and fleas and lice I have found with the same in the blood they have sucked up. I presume young dogs then eat the insects, and so become affected. For Dr. Thin's book on leprosy the medical profession should be grateful. It is a monument of industry, and will go a long way to prove the contagious nature of leprosy. In any future edition I would suggest that, instead of two photos. of lepers, he should produce twenty, as nothing is more likely to educate the eye of the student better than well-executed photographs. Dr. Arning, in his visit to the Sandwich Islands, it appears, has not been able to find the bacteria of leprosy in the blood of mosquitoes that have sucked lepers, but this may yet be proved to be the case.

I was not successful in my first searches for filaria. Manson was the first to discover them, and I found them subsequently. (See Cobbolt's Entozoa, p. 192.) Afterwards every observer verified the fact. My friend, the late Dr. Wm. Hobbs, often spoke to me about mosquitoes distributing his vaccinations far and wide in the houses of his patients. This was before mosquito net was much used. In the Sandwich Islands the mosquito is believed to distribute leprosy; there, no doubt, are several agents, and such blood-sucking insects as bugs, fleas, and others may work to the same end. In the penetrating organ of the tick one sees the fluid with air spaces moving up and down under a power of about 50 diameters. Is it not more than likely that leprous bacteria are at times dislodged from the cells in the skin and distributed in this manner? If parasites, 1-100 of an inch long—the embryonic human filaria—can be carried by mosquitoes far and wide, small impediment exists to the distribution of the minute bacteria of leprosy. Lewis says (see Cobbolt, p. 197): "It was observed that nearly all the mosquitoes captured in one of the servant's homes contained hæmatozoa." With regard to the destination of hæmatozoa, I have nothing to add to the observations of Manson, whose researches tend to show that water may contain the parasite, and that potable water should be filtered or boiled, and that thirsty children should have suitable provision made for them. But bacteria may be implanted direct, as Dr. Hobb's vaccination was spread. We know that mosquitoes and other insects give out a poisonous saliva, which, in the case of mosquitoes, gives severe pain. Death to dogs comes of the bite of the Queensland tick, and a temporary blindness of some weeks' duration I have seen in the human subject. This poisonous saliva is inserted, and why not with it bacteria acquired from any leper bitten previously?

The food theory of distribution of leprosy does not appear to help us. Everybody here, almost without exception, has partaken of Chinese-grown vegetables. They are mostly cooked, but radishes, lettuce, and parsley are consumed raw. I always peel my radishes, and never eat uncooked leaves. If leprosy were distributed by food, it is strange the disease does not spread more extensively. Consider the enormous export of articles of food from China and India to Great Britain with no single instance of leprosy developing therefrom. Living together and intimate association seems necessary in the generality of instances, as the interesting case in Dublin, related by Dr. H. Benson, goes to prove; but in Queensland and New South Wales there are several cases where no close relationship with the Chinese can be discovered. Chinese have nothing to do with our cows, and in their own country do not keep them. Our Chinese are gardeners and shopkeepers, occasionally cooks to Europeans. The colonists never sleep in their shops, or work with or sleep with them in their gardens. The Chinese grow peanuts (*Arachis hypogæa*) and sell them to children. They are eaten uncooked, but the shelling is done by the purchaser. There are several cases of leprosy in persons of European descent that have happened in Queensland besides the two recorded previously. One was a German, who worked on a sugar plantation. He had tubercular leprosy of the face. There was no evidence of his association with Chinese. He is now dead. A second was a gravedigger, resident of an inland town. He had carious bones in the feet, from which he suffered terribly, and died. Three cases now are from a northern town. A Chinese leper or lepers were camped in the outskirts of this town, but no contact is acknowledged. The first case of the wandering aboriginal suffering from leprosy has just been discovered. He has probably contracted it from a kanaka camping with him.

Typical case of leprosy ; mixed form ; in a Chinaman, 7 and 8.

These three cases from the northern towns are vexatious to understand, as well as Dr. Ashburton Thompson's cases in New South Wales, Report of 1891, where no special communication happened between them and Chinamen, except the purchase of vegetables. We know that Chinamen and other Asiatics and Polynesians live here apparently well for years, then develop leprosy, both tubercular and anæsthetic. That they have brought the disease with them in a latent state cannot be doubted. To be successful in preventing the spread of leprosy in Australia it will be incumbent on the various Governments to discover these cases at the earliest possible period. All such people, Asiatic or Polynesian, it will, therefore, be necessary to examine by medical men familiar with the general aspect of leprosy, and to call in the aid of bacteriology to determine, if possible, whether suspected spots, indurations, and skin affections may contain the leprosy microbe. Before being admitted into the country an examination should be made, and an annual inspection afterwards. This may seem rather onerous and expensive, but if by such means we can be saved the infliction of permanent leper hospitals it may be a direct saving of public funds.

Charlatanism in Relation to Disease.

F. TRUBY KING, M.B., B.Sc. Pub. Health, Edin.

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IN this paper the author draws attention to the importance, from a public-health point of view, of preventing the evils of quackery. He then notes the enormous extent of quack advertisements in colonial papers, which he regards as being an index of the extent of profit of a "traffic which can only be carried on by the creation or aggravation of human disease and suffering;" and points out that the "nervous-debility" advertisements appearing in New Zealand papers, and emanating from Sydney, "exceed in number those from all other sources combined, including New Zealand herself." He deals with the evil influence of Lallemand's book, "*Des Pertes Seminales involontaires*"; the use made of it by quacks; and quotes Trousseau's criticism of Lallemand's statements, ending as follows:—

Je suis convaincu que Lallemand a singulièrement rembruni le tableau, et qu'il a commis surtout une faute capitale, qui consiste à attribuer les perturbations du système nerveux à l'épuisement causé par la perte exagérée et trop souvent répétée de la semence, tandis que les *troubles nerveux* pourraient, à plus juste titre, être considérés comme la *cause* de la spermatorrhée.

The author then says:—"From the time of the early protests of Sir James Paget down to the present day our leading surgeons and physicians have tried to stem the tide of error unwittingly initiated by Lallemand; but popular treatises on the genital system, and other forms of advertisement, published in a spirit of unscrupulous greed, have fanned the fears of the laity; until now, a few suggestive lines in a newspaper suffice to fascinate and make easy prey of thousands of the rising generation. Indeed, the processes of capture have become so ridiculously simple, and, in many instances, appear so transparently fraudulent, that at first sight one is inclined to doubt the possibility of their being effective except in the case of a very few morbidly credulous and weak-minded youths. However, a little reflection shows that the means employed are, on the whole, admirably adapted to the end in view. Their success depends, for the most part, on four broad facts, viz.:—

- (1.) The secrecy, reserve, and delicacy, as to sexual matters, fostered by modern civilisation; and the general absence of such knowledge, in regard to the generative functions, as might prevent youths from being misled into regarding natural phenomena as evidences of disease. There is, of course, an innate tendency upon the part of humanity to hold *omne ignotum pro horridis*. How easily might young women be black-mailed on account of menstruation, if, while complete secrecy was enjoined in regard to all sexual manifestations, no trouble were taken to inform them of the harmless nature of the process; and were they, on the contrary, artfully persuaded by quacks that it was the symptom of a loathsome disease, curable only by the adoption of special means.

- (2.) The instability and receptivity of the nervous system in general, and of the sexual portions of it in particular, during puberty and adolescence.
- (3.) The belief in authority taught throughout school life, and the credulity engendered in regard to anything seen in print.
- (4.) The universal tendency to readily accept as true a whole statement if a portion of it happen to accord with personal experience."

Dr. King then points out the importance of the epoch puberty, quotes Sir J. Crichton Brown and Bevan Lewis on this matter, and says that this is nevertheless "the period of life which modern civilization allows the quack every facility to dominate." He gives extracts from a much advertised Sydney pamphlet (regarding seminal losses), and says:—"Statements such as this, which gain entry into half our colonial homes, might have inspired Tennyson to write his incisive lines:—

Feed the budding rose of boyhood
With the drainage of your sewer,
Send the drain into the fountain
Lest the stream should issue pure.

It would be well if in the region of mind the influence of these pamphlets and their authors stopped short at the infliction of pain; unfortunately they urge their victims not unfrequently to despair and madness. Hilton Fagge, writing on hypochondriacs, says:—"Perhaps the most miserable of all hypochondriacs are those who refer their sufferings to the genital organs. To this class belong by far the larger number of those who consult one for spermatorrhœa * * * and to make matters worse, they are sure to have studied with avidity a number of books and pamphlets written for the very purpose of stimulating their apprehensions, and of inducing them to seek relief from the quacks who write them."† Clouston writes still more emphatically:—"For a complete record of the feelings and symptoms of the youthful masturbator, one should rather go to those shameful quack advertisements put into the country newspapers, than to medical books. They are there set forth at large, with just enough concealment to make them suggestive. That such abominable suggestions of evil should be allowed to be scattered broadcast into the families of decent people is, to me, one of the standing marvels of jurisprudence. They do and can do no good to anyone; they aggravate the miseries of those who are suffering from the minor effects of this vice by keeping them constantly before their minds; they suggest evil thoughts to those who might be free from them, and they fatten the vilest of mankind. I verily believe, and I speak from some experience, that there are about as many people made insane by these advertisements, and the pamphlets sent out by the advertisers, as by the habit of masturbation itself."

Dr. King then points out the influence of suggestion in bringing about the morbid condition referred to, and quotes, among others, the following from Dr. Moll's book on hypnotism:—"Two laws of the psychical states of human beings of immense importance to psychology, physiology, and medicine, as well as to hypnotism are—(1) Men have a certain proneness to allow themselves to be influenced by others through their ideas, and in particular to believe much without making conscious logical deductions. (2) A psychological or physiological effect tends to appear in a man if he is expecting it." He quotes also Jacobson's adverse criticism of the use of the term spermatorrhœa, and Sir James Paget's strictures on Lallemand's false teaching. He proceeds to state that "some years ago an itinerant Sydney 'specialist' settled for a month or so in Wellington, and after he left quite

† Clinical lectures on Mental Diseases by T. S. Clouston, M.D., &c., London—J. and A. Churchill.

a crop of nervous debility patients presented themselves at the hospital," gives particulars of two of these cases, and concludes by saying:—"Little advantage would be gained by further discussing the nature, prevalence, and effects of charlatanism; but a few words must be said in regard to what may be done in the direction of combating the evil. Again, I shall confine myself to one aspect of the subject, namely, to the class of quackery dealt with in the English 'Indecent Advertisement Act' of 1889; and shall merely give a summary of what has been effected in this Colony up to the present time. Two years ago, after a discussion which followed the reading of a paper on the 'Suppression of Indecent Publications,' the Dunedin branch of the New Zealand Medical Association passed the following resolution:—"That this branch of the New Zealand Medical Association views with alarm the spread of immoral and corrupt publications, and would urge on the other branches the question of how the growth of indecent advertisements and literature can best be met, with a view to taking concerted action in the matter." Similar resolutions were passed by the Auckland, Wellington, and Christchurch branches. At the annual general meeting of the Association six months later the following resolution was carried:—"That the Association recognising the gravity of the evil arising from the dissemination of corrupt and indecent publications and advertisements in New Zealand, request the Government to appoint a select committee of both Houses to inquire into the matter with a view to its suppression."

As a result of this measure the Presbyterian Church of Otago took the matter up warmly, and supported the action of the association by petitioning the Government in the same direction. Then the *Otago Daily Times* published two strong leaders dealing broadly with the whole subject; and the final outcome was an Indecent Advertisements Bill, which went through the Upper House without opposition, and passed two readings in the lower. Both the Premier and the leader of the Opposition expressed strongly favourable opinions towards the Bill, and the former promised to push it through, if the business of the country would permit; but during the remainder of the Session no opportunity was afforded for a third reading. This year an 'Offensive Publications Bill,' of a rather more comprehensive character, has been introduced in the Lower House, and has now passed its second reading unopposed. This Bill is certainly a very decided improvement upon the English Act of 1889, regarding which Dr. Bateman wrote in the *British Medical Journal* for March, 1890, as follows:—"An advertisement may be as *suggestive* as possible, but, with a clever lawyer for the defence, it is perfectly within the bounds of possibility for all such cases to be dismissed. The Act will either have to be read more generally, or will have to be amended and made to cover more ground, unless it is to be a dead letter." In the promotion of our measures we have received very little assistance from the general press of the country. With the exception of the *Otago Daily Times*, the New Zealand newspapers have directly held themselves aloof. Like most of their Australian contemporaries they are glad to share in the profits of the trade, and show no anxiety to inquire into its effects. . . . In conclusion, I may point out that, while advocating prohibitive legislation for New Zealand with reference to offensive publications, we have not failed to recognise that more laws cannot abolish the evils of any form of quackery. We only hope that some of the grosser and more palpable wrongs now inflicted upon society by charlatans may be lessened. Until the young are taught such rudiments of physiology as may be necessary for their own protection, quacks will continue to live and grow fat upon their ignorance."

Some Remarks on Tubercular Phthisis.

G. L. L. LAWSON, M.R.C.P., Edin., M.R.C.S., Eng., D.P.H., Edin.

IN this paper Dr. Lawson dealt with the habitat, and the modes of propagation and growth of the tubercle bacillus, together with its means of entrance into the organism. He also considered the effect of climate on the growth of the bacillus, and stated some general rules as to climatic treatment of phthisis, giving the physiological data on which these rules are based. He also drew attention to the percentage death rate from phthisis (viz., "about 10 per cent. of all deaths"), stated that these are preventable deaths, and concluded by saying:—"Phthisis is best prevented by (1) The avoidance of all sources of infection. (2) Efficient ventilation. (3) Having all food, including milk, well cooked. The patient ought always to be informed that his complaint spreads by contagion; that unless he use due precautions he may be a source of infection to those about him. If both patient and friends realised the dangers and took proper precautions, in a few years hence, phthisis would be reckoned as a disease of the past."

Statistics of Lepers at Friday Island and Dayman Island.

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THE total number of lepers who have been on Dayman Island and Friday Island Leper Stations is sixteen. Of these, eleven have died, ten having died at Dayman Island and one at Friday Island.

Nationality—Chinese, 11; South Sea Islander, 1; Malay, 3; native of Madras, 1. All but one of these were sent here from southern parts.

DURATION OF THE DISEASE.

2 cases, 15 years.	1 case, 3 years.
2 " 12 "	2 cases, 9 months.
1 case, 9 "	2 " 1 year.
2 cases, 8 "	1 case, 18 months.
2 " 5 "	—
1 case, 4 "	Total, 16

CAUSES OF DEATH.

Leprosy in 9 cases; suicide by hanging in 1 case; intermittent fever in 1 case.

Dayman Island has been abandoned as a leper station on account of the impossibility of the lepers receiving such attention as they required. Friday Island has suitable houses erected to accommodate the patients, and a space of ground has been enclosed for their sole use. This enclosure includes a portion of the seashore.

Insanity in its Relation to the Law.

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IN the year 1843, in consequence of the popular alarm excited by the acquittal, on the ground of insanity, of M'Naghten, who, that year, shot Mr. Drummond in the lobby of the House of Commons, mistaking him for Sir Robert Peel, concerning whom he had insane delusions that he was one of a number of persons who followed him everywhere blasting his character, and making his life wretched, the House of Lords put to the Judges certain questions and received from them* certain answers which have ever since been held to be the interpretation of the law on this subject, and a more or less binding authority for Judges in charging juries in cases in which the question of insanity arises.

Notwithstanding that the authority has been described by eminent jurists and among them Sir James Fitz-James Stephen, as "in many ways doubtful," and the fact that individual Judges have declined to be bound by its limitations, and have directed juries in a wider and more scientific spirit, notwithstanding that there has been an enormous advance in our knowledge of disorders of the mind, that in hospitals and asylums throughout the civilised globe opportunities have been taken advantage of for scientific investigation, and notwithstanding that the whole literature of the subject is opposed to the legal dogma, the authority still remains. The dogmatic adhesion to phrases having no basis in fact and to the cast-off theories of physicians of bye-gone generations, is still for the most part rigidly adhered to in England and in the Australian colonies, and Mr. Justice Molesworth in Colston's case tried very recently in Victoria, and the Chief Justice of this Colony at the trial of a man named Cecil at Wagga Wagga within the current year, used in directing the juries the very words of the answers given by the Judges on that occasion. In the Victorian case the Judge's ruling was subsequently upheld on appeal to the Supreme Court. I need not place before you the questions put to, and the answers given by the Judges, they are sufficiently well and generally known. The result is briefly summarised as follows:—No act is a crime if the person who does it is at the time when it is done, prevented either by defective reason, or mental power, or by any disease affecting his mind,

- (a) From knowing the nature and quality of the act he was doing.
- (b) From knowing that either the act is illegal or contrary to law, or that it is morally wrong.

Insane delusions as to existing facts standing alone and in themselves were expressly held to be no excuse for crime even if the offence was committed as a consequence thereof.

* The number of Judges was fifteen, and the answers expressed the opinion of fourteen of them. Mr. Justice Maule gave a reply of his own.

The only change which has taken place in the law relating to insanity or in its interpretation during the nearly fifty years which have elapsed since M'Naghten's trial, took place in the year 1883 (on the consolidation of the criminal law) in England. The practice of acquitting the prisoner on the ground of insanity was then so far changed that the jury are now asked, (first) to give a verdict of guilty or not guilty of the crime charged, on the facts as to the crime itself placed before them, and (second)—which had not been done before—if guilty to say if the prisoner was insane at the time he did it. This, though a comparatively minor matter, is clearly a step in the right direction—but has not yet been followed in any of the Australian colonies. The law as it stands, or rather the interpretation of it given by the Judges in 1843, for it is doubtful if this is the law, has never been acquiesced in by the medical profession and every writer on insanity in its relation to the law has had something to say on this subject, while several have discussed the question fully and exhaustively. I can therefore have little or nothing that is new so far as opinion goes to say on this subject, but I have certain interesting facts to place before you which will show how imperfectly and unscientifically the law, as it now is administered, has worked during the last twenty-four years in this Colony.

During 24 years from September, 1868, to September, 1892, I have carefully noted the number of cases in which prisoners were acquitted on the grounds of insanity and ordered to be confined during the pleasure of His Excellency the Governor as the representative of Her Majesty. They have been 49 in number and of these 25 have been tried on charges for which the penalty was death, viz.—murder, attempt to murder, and rape; whilst the remaining 24 were arraigned for maliciously wounding, arson, attempt at suicide and other more or less serious offences. These latter are on the whole of minor importance to the public since the carrying out of the death penalty is not in question and as safe custody is necessary it is but little interested or concerned as to whether that custody is that of the prison or the hospital for the insane, but all are of equal interest in the study of mental disturbance and criminal responsibility. The number of persons found guilty and sentenced to death during the 24 years above mentioned on charges of murder, attempt to murder, and rape, in whose cases the Executive Council was called on in one way or other to interfere on the special ground of mental unsoundness and presumed irresponsibility was 12, whilst the number found guilty of other offences in the superior courts, sentenced to terms of imprisonment and found and certified to be insane in prison almost immediately after the trial—having almost certainly been insane when the offence was committed—was 13. Though I have given evidence in court in no single one of these cases I have had the whole 74 under my personal observation and have watched and studied them with some care, and in the 12 found guilty and lying under sentence of death for grave offence I have been consulted by the Executive and my recommendations in all cases adopted. Of these cases 9 were reprieved and dealt with subsequently as insane persons, whilst in 3 the sentence was carried out. It is only right that I should state that in four of the more important and difficult cases in which I have been consulted by the Executive I have had the benefit of meeting in consultation members of our profession, that in all these cases the advice tendered was unanimous, and that in the three in which the prisoners were finally executed this advice was in contravention of much popular clamour, some violent newspaper articles, and, in one case of public excitement, which manifested itself in the shape of pieces of blue metal through the windows of a medical

practitioner who was erroneously supposed to be one of my colleagues in this particular inquiry. This may perhaps serve to show that whatever advice has been tendered has not erred on the side of extreme views as to irresponsibility in these cases.

In the forty-nine cases acquitted on the ground of insanity, the juries were as a rule directed by the Judges in the terms, indeed in most cases in the words of the English Judges as set forth in answers to the questions propounded by the House of Lords, but in one or two instances a more liberal, and I venture to say, a more enlightened view was taken and the question put more generally. In examining closely these forty-nine cases as I have done, it is quite clear that in certainly more than one-half the cases the prisoners knew at the time the act was done, (*a*) the nature and quality of the act, and (*b*) that the act was wrong and contrary to law. Yet despite the Judge's directions, the jury, impelled by the medical evidence, the arguments or appeals of counsel, or by a common sense view of the question, took the bit between their teeth and gave a verdict of acquittal on the grounds of insanity in defiance of the Judge's direction, though probably in most instances with his real concurrence. These verdicts which I see no reason to dissent from—except in one instance—and which have been shown to be right in a large number of the cases by the marked, decided, and long-continued and complete irresponsibility as shown in various ways of the subjects—many of whom are still living in confinement—have been arrived at, therefore, in direct opposition to what is laid down to be the law. Is this calculated to increase the respect of the public for the law or its administration?

Turning to the twelve cases found guilty of the crime charged, which the Executive specially considered in view of the presumed insanity and irresponsibility of the prisoner, with the result that nine were spared the death penalty to which they had been sentenced, it should be pointed out that in most it was on the report of the Judge who had gone through the solemn process of sentencing the prisoner to death that the further inquiry was instituted, and certainly in several, if a wider view of what constituted legal insanity and irresponsibility had been placed before the jury, the prisoners would have been acquitted on this special ground. I think I have shewn that, though justice has been in the main done, the processes leading thereto are clumsy and unscientific, and that the result has been arrived at in spite of the law and by means outside its processes rather than by its means.

Now two questions arise:—

- 1st. Are the formal answers of the Judges given in 1843, in what may be regarded as almost the dark ages of psychological science, in answer to the badly framed questions of the House of Lords, to stand for all time as the definite authority on this question? and,
- 2nd. Is it not possible for our jurists, with or without the aid of alienist physicians, to adopt something more rational and more in accordance with the present state of our knowledge of mental processes and mental diseases?

Sir James Stephen, in his History of the Criminal Law of England, after a most learned, comprehensive, and dispassionate review of the whole question, says, "If it is not, it ought to be the law of England, that no act is a crime if the person who does it is at the time when it is done, prevented either by defective mental power, or by any disease affecting his mind from controlling his own conduct, unless the absence of the power of control has

been produced by his own default," and he further adds, "I also think that the existence of any insane delusion, impulse, or other state, which is commonly produced by madness, is a fact relevant to the question whether or not he can control his conduct, and as such may be proved, and ought to be left to the jury." Mr. Justice Wright, in an important case tried at Warwick, in July of this year,* laid it down as the law, that it was not sufficient to show that a prisoner was aware of the nature of the act to enable one to say if he was responsible, for he might not be able to resist an impulse, and if a man's act was the direct outcome of an insane delusion he ought not to be held responsible for the act, and one of the Judges of the Supreme Court of this Colony, during a trial for murder, about six years ago, in which insanity was put forward, directed the jury in these terms, "there is no reason to suppose that the prisoner, at the time of committing the murder, did not know the nature of the act he was committing, or that he did not know that he was doing an act highly criminal, or *that he was in any way from disease of mind UNABLE TO CONTROL HIS ACTIONS.*"†

The American Courts, which for long followed in the wake of those in England, are exhibiting a disposition to emancipate themselves from an authority which they perceive to be founded on defective and erroneous views of insanity, whilst the latest German penal code provides that "an act is not punishable when the person at the time of doing it was in a state of unconsciousness, or of disease of mind, by which a free determination of the will was excluded."

You will see that in addition to the inquiries—Did he know the nature of the act? Did he know that it was wrong? We have here the further distinct issue, could he help it? This is a most important and reasonable addition to the recognised exemptions from legal responsibility, and if it were put before the jury in all cases, or at all events, fairly considered by the Judge, the medical views of this subject would be for the most part met. How can a man be responsible for what he cannot help? and we, as students of insanity, are absolutely certain that in many cases of mental disease there is impairment, perversion, or absolute loss of the power of self-control, whilst the knowledge of right and wrong remains more or less unimpaired.

I have not been able to obtain from legal authorities any better objections to an alteration of the interpretation of what is the law in the direction indicated than that such alteration would unsettle a settled question; would let loose on juries the flood-gates of medical speculation; render their duties much more difficult; and perhaps lead to the acquittal of guilty and responsible men. The first objection needs no answer. The question, if settled, is settled in a way open to question, and shown to be unsatisfactory in its incidence. The second is much more serious though not insuperable, and is to some extent valid by reason of the action of medical practitioners who, I say it with pain and mortification, have gone, and do go into the witness-box either with views altogether nebulous and indistinct on the question of insanity and irresponsibility, or apparently with a view of parading certain theories, vagaries and inconsistencies which have no basis in experience, or in pathological or scientific research. But it should not be difficult to procure the evidence of the more thoughtful and experienced practitioner on this subject, and to exclude the ill-considered views of the self-confident theorist, or the nebulous speculations of the man who has never given more than a passing thought to the general study of the question; whilst as to the

* A case of parricide at Leamington, in which the prisoner was found "guilty, but not responsible, being insane at the time of committing the act."

† Sir George Innes, at trial of J. O'S., for murder at Darlinghurst.

anticipated difficulties of the jury, if such a body is fit to decide on the evidence adduced, whether the person before them knows the nature and quality of the act he has done, and knows also that it is wrong or illegal, it is surely fit to decide the further question (also on the evidence adduced), Could he help it or control his actions? The fact is, however, that a jury is not a fit body to decide any questions of this kind, and whilst it may be wise to leave to the jury the question of fact as to whether the accused committed the murder or not, the further question as to his mental condition and responsibility now recognised as a separate question by the English statute, would be best left to the Judge, who should be allowed to call such medical evidence or receive the assistance of such assessors as the Executive may place at his disposal or he may be empowered to call to his aid. We can, however, hardly expect such a radical alteration in criminal procedure to come in our day, though the proposed alteration of the law in this Colony in the direction of the abolition of the coroner's jury shows that changes even in the direction above suggested are not impossible, and it behoves us, therefore, to help the jurists who are inclined to meet our views by formulating more distinctly our knowledge on the subject, and by answering the questions with regard to self-control and responsibility in some more definite and satisfactory manner than has heretofore as a rule been usual.

Some authors have urged that insanity, whatever be its nature, renders a person irresponsible in the eye of the law, and the very latest writer on this subject, Dr. Duncan Greenlees, who has recently left England to take charge of the Grahamstown Asylum at Cape Colony, lays it down definitely in a little volume published this year, that "Medical insanity is equivalent with legal irresponsibility," and that "insanity always accompanies epilepsy." I can accept neither of these views any more than I can accept the views of gentlemen who go into the witness-box and plead irresponsibility in cases in which they cannot give a definite name to the form of mental unsoundness, detail as existent in the case under consideration, symptoms consistent with any known form of classified insanity, or write a medical certificate which would justify the detention of the patient in an hospital for the insane or hold water in a court of law. I am tempted to think with Mr. A. Wood Renton, a lawyer, who has written thoughtfully on this subject, that when medical men state that all insane persons are irresponsible there is a "suppressed minor" in their propositions, and I am sometimes enlightened by an examination of the Medical Register when I find their registration is of recent date, and the impetuosity of youth has out run discretion. At the same time there is no difficulty in showing that a large proportion of insane people who know right from wrong cannot control their actions, and are irresponsible by reason of their disease. I pass over altogether the cases in which irresponsibility is now admitted, the frenzy of acute or subacute mania, of mania a potu, and of general paralysis, the agony of acute melancholia, the violent or purposeless acts of the known idiot or imbecile, the furor, and also the automatic action of the epileptic, and the fleeting though severe mental disturbance of mania transitoria.

The dispute between law and medicine now ranges itself mainly about three forms of mental unsoundness—and these are:—

- 1st. Insanity with delusions, illusions, or hallucinations;
- 2nd. Insanity with defective mental power, including imbecility or partial congenital weakness and dementia the result of disease.
- 3rd. Insanity with impulse, destructive, short-lived and intermittent; fury without ordinary delusions or marked weakness of intellect.

In cases in which decided delusions or optical or auditory hallucinations exist, and the delusion or hallucination has a direct reference to or bearing on the crime committed, the person cannot be responsible. A delusion of this kind hardly ever stands alone but is in all cases the result of a disease of the brain which (I quote Dr. Griesinger, a standard authority on this subject) "interferes more or less with every function of the mind, falsifies all the emotions, alters in an unaccountable way the natural weight of motives of conduct, weakens the will and sometimes, without giving the patient false impressions of external facts, so enfeebles every part of his mind, that he sees and feels and acts with regard to real things as a sane man does with regard to what he supposes himself to see in a dream."

Dr. Bucknill has asserted that "a lunatic is a lunatic to his finger ends," and even if we do not accept this in its entirety, we acknowledge that it is unphilosophical and contrary to sound knowledge to assert the independence of one part of the body of another, to say that disease of any important organ may exist without more or less affecting the healthy performance of functions in all the others. How much more unphilosophical and contrary to sound knowledge must it be to say that our mental faculties, and the various parts of the brain through which they act, can be parcelled out into divisions so distinct that serious disease or disturbance of one does not disturb the other, "that one portion of our intellectual organism may be in ruin whilst the rest are in sound working order." In cases in which the delusion has apparently no bearing on the crime whatever, it will not infrequently be found that it has such a bearing, and at all events it is a symptom of serious disease of the brain. The action may be the direct consequence of the delusion although the sane mind is unable to follow the process which led up to it. There is an incoherence between the ideas of insane people, and an incoherence also between their ideas and actions. Delusions do not destroy, but they pervert the mental faculties, and it is impossible to say although a delusion is apparently unconnected with a crime, but that by some process of crooked and morbid thought it has not been a compelling cause of its commission. These cases require great and patient sifting, they must, to some extent, be considered individually, but in almost all, if not in all, it will be found that there is at least such a measure of irresponsibility which entitles the patient to profit by the indulgence of the law.

Turning to the second class of cases, those of partial congenital weakness, or dementia the result of disease, I need say little or nothing as to the latter. In these the affection, as a rule, comes on late in life and the cases seldom figure in criminal courts, though civil actions as to testamentary capacity and as to business capabilities by reason of mental enfeeblement are sufficiently common. It is the class of cases in which there is congenital feeble intelligence, continuing through life, but not so marked as to constitute idiocy or marked imbecility, or to compel the sequestration of the individual in a special institution, that interest us in regard to criminal responsibility, and as the crimes committed are often sexual or prompted by sexual instincts these are of special importance in this Colony where, owing to peculiar circumstances, the penalty for rape is still death. These people often earn their own livelihood, especially in the Australasian colonies, where labour is scarce and always highly paid, and where a purely mechanical service—the mere hewing of wood and drawing of water—is acceptable and remunerated at least by the necessities of life. They present no special appearance to the uneducated eye, and sometimes they even answer to the ordinary tests of intelligence, but peculiar conformations of the skull, highly arched

or keeled palate, peculiar teeth and ears and abnormal bodily or sexual development often tell their story to the practised alienist, and searching inquiry into their intellectual development will serve to show their mental capacity and standing. Now these people have no initiative power, no capacity for adaptation. Mentally and bodily they work on a low mechanical level, but with feeble mental power, they have strong animal passions, and tempers often but little under their control. Driven by lust they are prone to acts of violence in its gratification, and enraged by slight provocation, they are guilty of inordinate violence which results in murder. They act without reflection, without any due reasoning power, any full measure of consequence, and without power of self-control, and some of the most apparently purposeless murders have been committed by this class, though they cannot be said not to know the nature and quality of their acts. I do not hold all these cases as fully and completely irresponsible. They require individual and careful differentiation, but as a class they are not fully responsible, and to inflict the death penalty is to punish them beyond the measure in which punishment is meted out to their more gifted and responsible fellow men, whilst such punishment can in no way be deterrent to men with minds of a like mental calibre and competency. In all these cases it is necessary that weakness of intellect and physical degeneration should be fully and completely proved and the facts, sometimes trivial in themselves, and when standing alone, must be duly marshalled and presented as a compact and convincing whole. It is in some of this class of cases that it might be well if a middle course, as suggested by Sir James Stephen, could be adopted and a verdict of "Guilty, but his power of self-control was diminished by mental weakness or disease" be found by the jury. Insane impulse—I do not use the terms irresistible or uncontrollable impulse—has always been the greatest stumbling-block to the legal mind, and this particular form of mental disorder has been pleaded as an excuse for crime, with perhaps less reason and certainly with less substantial proof, than any other. It is easy to understand the difficulty felt by lawyers when insane impulse alone—an emotional disturbance without intellectual disorder or weakness—is put forward as a plea for irresponsibility, but to those who have had long experience of insanity and have seen to what extent morbid or insane impulse accompanies other forms of intellectual disturbance and how large a share it contributes to the difficulties of asylum management, by reason of its existence with intellectual conditions but little perverted or weakened, there is less difficulty in understanding that it may stand alone. I confess, however, that I should shrink from going into the witness-box and holding up impulse alone, without any collateral proof of mental unsoundness, as a plea for irresponsibility. In most of the cases however there is other evidence. In some it will be found that there is accompanying hallucination or delusion carefully concealed by the sufferer, or minor epilepsy of which he is unaware. In others there are distinctly insane acts accompanying the crime and evidence of a brief period of transitory mania. In others again the sufferers can show in their prior history that the impulse has been felt for long periods or at certain crises, has been again and again resisted, and that in some instances they have sought the protection of the police or of friends, or have even presented themselves at asylums and pleaded for admission as voluntary patients dreading a failure of their self-control. In yet another class there is evidence of change of feeling and of manner, of strange conduct for which no reason is given, of erratic and apparently purposeless journeyings, of outbreaks of unprovoked violence or of violence on trivial provocation, all these being foreign to prior habits and conduct, and with

all these perhaps very marked and decided evidence of well-marked hereditary insanity. In all these cases such collateral evidence when it exists should be clearly pointed out; if there is none of it it is better to stand aside. The mere act itself however strongly suggestive of insanity will scarcely be evidence of insane impulse. A few words in conclusion as to epilepsy and insane heredity. The existence of either or both of these are no proof of insanity—when standing alone—and should never be brought forward in the absence of other evidence. There are hundreds of epileptics—having infrequent convulsive fits—who never display intellectual disturbance or epileptic automatic action and who are practically sane and responsible, and there are multitudes of the direct and immediate as well as the collateral descendants of insane people who escape all appearance of mental unsoundness.

Statistics of Insanity in New South Wales considered with reference to the Census of 1891

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STATISTICS on any subject are usually but not necessarily dry and uninteresting. A statement however of the proportion of insanity to the population, the nationality of the insane, their ages, condition as to marriage, religious profession, and death rate may be of value if only as a standard for future comparison.

According to the Census taken on the 5th April, 1891, in New South Wales, the population was 1,132,234, made up as under:—

TABLE I.

Population.	Males.	Females.	Total.
General population (exclusive of Chinese and Aborigines).....	594,448	515,350	1,109,798
Chinese—			
(a) Full Blood	13,133	156	13,289
(b) Half Castes	422	445	867
Aborigines—			
(a) Full Blood	2,893	2,201	5,097
(b) Half Castes	1,663	1,520	3,183
Total population on 5 April, 1891	612,562	519,672	1,132,234*

*The figures used in this paper are the Census returns of New South Wales taken on April 5, 1891, and the Statistics of Insanity on 31st December, 1891, in the Report of the Inspector-General.

Turning to the statistics of insanity, we find that on the 31st December, 1891, there were 3,134 registered insane persons in the Colony, made up of 1,912 males and 1,222 females, or showing a proportion of 1 insane person to every 361 or 2·77 per 1,000 of the general population. On referring to the statistics of 1881, ten years ago, it appears that the population of the Colony as ascertained by Census was then 751,468, and that the number of insane persons under official cognizance on 31st December of that year was 2,218, being 1 in 338, or 2·95 per 1,000, so that whilst the number of insane persons increased during the ten years by the large number of 916, they were proportionately fewer in relation to the population at the close of 1891 than at the same period in 1881, ten years earlier.

Year.	Population of New South Wales, Census April 5.	Total number of insane in New South Wales, 31st December.	Proportion of insane to population in			
			New South Wales.	England.*	Scotland.*	Ireland.*
1881	751,468	2218	1 in 338 or 2·95 per 1,000	1 in 352 or 2·84 per 1,000	1 in 370 or 2·70 per 1,000	1 in 386 or 2·59 per 1,000
1890	.....	.....	.....	1 in 343 or 2·91 per 1,000	1 in 335 or 2·98 per 1,000	1 in 288 or 3·46 per 1,000
1891	1,132,234	3134	1 in 361 or 2·77 per 1,000	.....	.....	.....

* The figures for Great Britain and Ireland are taken from 1881–1890, as the returns for 1891 are not yet available.

From the above calculations it will be seen that the proportion of the insane to the population in this Colony is smaller than in either England or Scotland, and remarkably so compared with Ireland. To account for the high percentage of the insane under certificate in Ireland, a Committee on Lunacy Administration, appointed by the Lord Lieutenant, set forth in a report published in 1891, that "The persons who have emigrated from Ireland consist almost entirely of those who are sound in mind and body. Emigrants have always been of this class; but it is more true of them now than formerly, because in so many of the countries to which they go, emigration of weakly persons is prohibited. There is an exodus of the strong and sound; but the infirm, the insane, the imbecile, the idiotic, the deaf, mute, and the blind, are left at home. Emigration thus leads to an undue proportion of defective persons of all sorts to population in the districts or countries from which it is taking place." While the proportion of insane in relation to the population in all parts of the United Kingdom is increasing—slowly as regards the two divisions of Great Britain, and somewhat rapidly as regards the sister island—the proportion to population in N.S.W. has been practically stationary, and on the whole has rather diminished than increased during the ten years under consideration. On the whole, it must be conceded that the statistics of insanity in New South Wales compare not unsatisfactorily with the statistics of the United Kingdom; but it must be borne in mind that in new countries the general conditions of life are usually more favourable to mental soundness.

In these colonies there is but little real poverty,—the number of large cities is not great, so that overcrowding, and consequent insanitation, are less common,—heredity has not had time to exert its full evil effect,—mental poverty, through want of training and education is rare,—the Australian-born is unemotional to an unusual degree,—life is not taken very seriously,—self-reliance, even to self-assurance, is their possession,—and the climate of almost all the colonies undoubtedly lends itself to the acquiring and keeping up of physical, and therefore to a large extent of mental, health.

On the other hand, it is certain that a large proportion of the insane in New South Wales are importations, no prohibition being in force to prevent their introduction, as obtains in most, if not all, of the other Australasian colonies.

In almost all countries, and especially in those with a settled population the proportion of insane women in relation to the female population is greater than the proportion of men in relation to the male population, and it is interesting to compare the statistics of England and Wales with those of New South Wales in this particular. In England and Wales in 1890 the proportion of insane to population was for males 2·70 per 1,000, and for females 3·11 per 1,000, whilst in New South Wales the proportion was for males 3·12 per 1,000, and for females 2·35 per 1,000. This remarkable difference is best shown in tabular form thus:—

	Proportion of insane to population per 1,000.	
	Males.	Females.
New South Wales	3·12	2·35
England and Wales.. ..	2·70	3·11

To account for the larger proportion of insane women in England it is held—

- 1st. That the physiological crises of a woman's life, such as the onset of menstruation and the menopause, especially the latter, are responsible for much mental disturbance, and in addition to these, pregnancy and childbirth are decided factors in starting mental disorder.
- 2nd. That insane women live longer under asylum care, being less subject to general paralysis, and the more rapidly destructive insane lesions, and less affected by urinary and other complications, which tend to shorten life in insane persons. This is plainly shown by statistics in this Colony, as well as elsewhere, and as a consequence there is, as time goes by, a greater accumulation of chronic cases among the female asylum populations.

What then is the explanation of the smaller proportion of insane women in this Colony?

It is probably to be sought—

- 1st. In the circumstance that for many years—each of which contributed its quota of insane persons to our asylum population—the proportion of males in the general population largely outnumbered that of females, and the residuum of these years, the chronic and incurable cases—largely males—still remains. This cause is even now to some extent in operation, as the excess of males over females in the general population was shown by the Census of 1891 to be 92,890.
- 2nd. In the peculiar struggles and trials of early colonial life, to which men were particularly subjected, to the lonely life of the shepherd, to the excitement of gold-mining, and to the greater stress and strain, consequent on ambition and enterprise, which, falling heavier on men everywhere, are particularly incident to this sex, and are combined with much hardship in the ordinary processes of bread-winning, owing to the peculiar condition of early colonial life.

The relative proportion of insane women is slowly increasing. In 1861 the proportion of insane males to the general population was 2·63; the proportion of insane females was 1·32 only, or, relatively, two of the former to one of the latter, whilst the proportion in 1891 had risen to 3·12 for males and 2·35 for females, or, relatively, three to two. There is reason to believe that in less than another thirty years the relative proportions in New South Wales will have assimilated to those in England and Wales.

The native countries or the nationality of the population of New South Wales, taken at the Census of 1891 and the close of the year 1881, and the comparisons as to insanity, are shown in the accompanying tables.

The population of Australian, of British, of French, of German, and of Chinese birth are given separately, and other nationalities are classified together. The number of insane is given under the separate nationalities, and the proportion of insane per 1,000 calculated for each.

Birthplace.	Population.			Number of Insane under care.			Proportion of Insane per 1,000 to the population.		
	Male.	Female.	Total.	Male.	Female.	Total.	Male.	Female.	Total.
1881.									
New South Wales	233,515	232,044	465,559	371	285	656	1·58	1·23	1·40
Other British Colonies and Possessions...	27,339	26,936	54,275	33	22	55	1·20	1·09	1·01
England and Wales	70,787	39,887	110,674	478	226	704	6·75	5·66	6·36
Scotland	15,828	9,251	25,079	165	50	155	16·59	5·40	6·18
Ireland	36,494	32,698	69,192	414	390	804	11·37	11·92	11·63
France	1,205	292	1,497	14	4	18	1·61	17·12	12·06
Germany	5,367	2,154	7,521	49	14	63	9·13	6·03	8·37
China.....	10,141	64	10,205	66	.....	66	6·50	...	6·46
Other Countries	9,535	2,288	11,823	108	15	123	11·32	6·55	10·40
1891.									
New South Wales	363,495	361,520	725,015	701	537	1,238	1·92	1·48	1·72
Other British Colonies and Possessions	55,575	44,496	100,071	118	57	175	2·12	1·28	1·74
England and Wales	95,849	58,380	154,229	617	287	904	6·43	4·91	5·86
Scotland	23,026	13,795	36,821	131	64	195	5·68	4·63	5·29
Ireland	39,449	35,602	75,051	559	467	1,026	14·17	13·11	13·67
France	1,585	445	2,030	19	7	26	11·98	15·73	12·80
Germany	6,976	2,589	9,565	81	22	103	11·61	8·49	10·76
China.....	13,048	109	13,157	84	.....	84	6·43	...	6·38
Other Countries ..	13,559	2,736	16,295	181	27	208	13·34	9·86	12·76

In the annual report of the Inspector-General of the Insane for the year 1882, the figures given in the census of 1881 were reserved in connection with the statistics of insanity at the close of that year, and it was pointed out that "the very small percentage of Australian-born population (*i.e.*, insane population) is to be accounted for by the fact that insanity is a disease most common in middle and old age, and is rare in childhood and youth, to which period of life one-third of the population mainly, if not entirely, of Australian birth belong." It would appear from statistics that mental disease or disorder occurs less frequently in childhood than between the age of 15 to 30 years, the vast majority occurring between 25 and 50, in other words, during full manhood and womanhood, the period of marriage, of stress and strain in fact of mental and reproductive power. In more detail, the most frequent age at which insanity appears is probably between 20 and 30; the tendency is rather less between 30 and 40, and between 40 and 50 it begins to diminish still further. In the report above cited it is also pointed out that "the high proportion of foreign born patients appears due, partly to the admission of the waifs and strays of all nations to our hospitals, the ports of other Australian Colonies being to a large extent closed to them, and partly to the peculiar isolation of foreigners in an English speaking community—an isolation which tends to mental disturbance."

The statistics for 1891 do not differ very materially from those for 1881 in the proportion of insane to the population. The chief points of difference are a small increase in the proportion of those of Australian birth, and a small decrease in the proportion of those born in England and Scotland—together with a considerable increase in the already large proportion of those born in Ireland, Germany, and "other countries." These changes are more clearly seen in the following tabular form:—

Birthplace.	Proportion of insane per 1,000 to population.		Increase.	Decrease.
	1881.	1891.		
New South Wales.....	1.40	1.72	0.32	.....
Other British Colonies and Possessions.	1.13	1.74	0.61	.....
England and Wales	6.36	5.86	.....	0.50
Scotland	6.18	5.29	.....	0.89
Ireland.....	11.63	13.67	2.04	.....
France	12.06	12.80	0.74	.....
Germany	8.37	10.76	2.39	.....
China	6.46	6.38	.....	0.8
Other Countries.....	10.40	12.76	2.16	.....

During the ten years the number of insane persons of Australian birth has almost exactly doubled those of English and of Irish birth, which have each increased by about 200, and those of foreign nationality, which have increased by 150. At the close of 1891 there were 421 persons of foreign nationality in the asylums of New South Wales. These constitute upwards of one-seventh of the entire asylum population, although the proportion of foreigners to the general population is less than one twenty-seventh. It is

clear that what was mentioned in the report of the Inspector-General for the year 1881, as "the admission of the waifs and strays of all nations" still continues.

A remarkable feature in the statistics for 1891 is the very large proportion of insane persons of Irish nationality, which stands at 13·67 per 1,000 of the Irish-born population. It is considerably more than double the proportion for England and Scotland, and is more than seven times as large as the proportion for Australia. No less than 1,026 persons of Irish birth were under asylum care at the close of 1891, being more than one-fourth of the total number of insane in the Colony, whilst the proportion of persons of Irish birth form only one-fifteenth of the total population of the Colony. These facts would seem to contradict the opinion of the Committee on Lunacy Administration in Ireland before-mentioned, because if only the strong and sound emigrate from Ireland, why should they as immigrants become so liable to mental trouble? It is indeed a curious fact that whilst the proportion of insane to population in Ireland is 3·46 per 1,000, the proportion of insane to the population of Irish birth in New South Wales is 13·67 per 1,000, and would seem to indicate that the restless and mentally unstable have emigrated in much larger relative proportion than those strong and sound in mind. This is also the conclusion which must be come to in examining the statistics relating to England and Scotland. Why should the proportion of insane to population in the people of these nationalities in New South Wales be more than double what it is in England and Scotland? It is worthy of note in passing how favourably the Chinese compare with other foreigners, the proportion of insane to population being 6·38 per 1,000, or about the same as the proportion for England and Wales. This comparatively low proportion is the more remarkable, as the number of insane Chinamen now under asylum care represents the accumulation of many years, during which the general Chinese population was much larger than it is at present.

According to the census of 1891 the aborigines of the Colony numbered 3,280, made up of 5,097 of full blood and 3,183 half caste. Of the insane at the close of that year there were but 8 of aboriginal blood, viz., full blood, 2 males, 1 female; half-caste, 4 males, 1 female. In relation to the total aboriginal population the percentage of the insane of both full and half blood is just short of 1 per 1,000. In 1881 it was 2·83 per 1,000. All observers are agreed that insanity in the primitive and uncivilised aboriginal is a very rare affection. Perhaps this rarity was more apparent than real, because, like most savage people, the natives (blacks) were wont to kill the demonstrative maniac, whilst the quieter forms of mental trouble either ended in the subjects of them being neglected and allowed to die, or, if melancholic, to commit, if they so wished, suicide. At any rate insanity would appear to have been comparatively rare till the Europeans came with their civilising methods. Then the ratio of insane rose in keeping with the contact of this civilisation, till in 1881, as before stated, it amounted to 2·83 per 1,000 of the aboriginal population and has again fallen to about 1 per 1,000 in 1891.

The ages of the insane in 1881 and 1891, as given in the following table, are interesting, as showing, as has already been pointed out, that insanity is most frequent between 30 and 50 years, when the strain and battle of life are most pressing. In the earlier years of life, notwithstanding a considerable amount of congenital idiocy or imbecility, the percentage of insanity is small, not reaching 3 per cent. at any age before 20 years. From the age of 20 to 30 the percentage is about 15 per cent., rises to 23 per cent. between 30 and 40, and to 25 per cent. between 40 and 50, when it rapidly falls. A

comparison of the statistics for the years 1881 and 1891 shows but little variation in the percentages, except that there is some decrease in the ages between 5 and 20, and some increase between 20 and 30.

Ages.	Patients under care.		Percentage.	
	1882.	1891.	1882.	1891.
1 to 5 years	4	1	·14	·02
5 „ 10 „	30	18	1·09	·45
10 „ 15 „	42	39	1·53	·98
15 „ 20 „	95	98	3·46	2·47
20 „ 30 „	397	671	14·46	16·94
30 „ 40 „	643	913	23·44	23·06
40 „ 50 „	693	968	25·26	24·45
50 „ 60 „	475	702	17·31	17·73
60 „ 70 „	256	379	9·33	9·57
70 „ 80 „	93	145	3·02	3·66
80 „ 90 „	15	24	·54	·60
90 „ and upwards	...	1	...	·02

With regard to the conditions as to marriage, as shown in the following tables,—taking the years 1881 and 1891—two somewhat important differences appear. The proportionate number of the single has increased, and of the “unascertained” decreased, the married showing 2·54 per cent. more at the end of the decade. This may probably be accounted for by the fact that of late years more care has been taken to ascertain definitely the social condition of the insane on their admission to the hospitals, making it not unlikely that many of the unascertained were single.

Social condition.	Patients under care.		Percentage.	
	1881.	1891.	1881.	1891.
Single	1240	2188	49·90	55·26
Married	656	1146	26·40	28·94
Widowed... ..	162	272	6·52	6·87
Unascertained	426	353	17·14	8·91

Social condition.	Per 1,000 of population.	
	Percentage.	Social condition.
Single males	3·81	Males single.
„ females	1·76	Females „
Married males	3·06	Males married.
„ females	3·83	Females „
Widowed males	6·21	Males widowed.
„ females	6·47	Females „

The religious profession of the insane under care during the years 1882 and 1891, with the percentages, are given below. With two exceptions there is little to call for comment. The total percentage of Protestants has

increased in the decade by 2·11 per cent., the Roman Catholics decreased ·38 per cent. A comparison of the insane of these two denominations in proportion to the total population of the Colony shows that of Protestants the number per 1,000 was 1·92, of Roman Catholics 1·28. Of the individual Protestant bodies, the Presbyterians, Wesleyans, and Lutherans all show an increase, and especially those tabled as other Protestant denominations, whilst the Church of England alone shows a decrease. The remaining sects, excepting the unascertained, call for no comment. As stated in connection with the social condition as to marriage, &c., the figures for 1891 are probably more correct than those at the commencement of the decade, because of greater care in eliciting facts on the admission of the patients into the hospitals. This would apply with equal, if not greater, force with regard to "religious professions," as all patients are expected to attend the ministrations of the respective chaplains who are attached to each of the hospitals:—

Religious Profession.	Patients under care.		Percentage.	
	1882.	1891.	1882.	1891.
Protestants—				
Church of England.....	1,191	1,645	43·41	41·55
Presbyterian	143	248	5·21	6·26
Wesleyan	70	126	2·55	3·18
Lutheran	50	76	1·82	1·92
Other Protestant denominations	47	154	1·70	3·89
Roman Catholics.....	1,045	1,493	38·09	37·71
Pagan	67	81	2·44	2·04
Hebrew.....	19	26	·69	·65
Mahomedan	5	6	·18	·15
Unascertained	106	104	3·86	2·62

It remains to indicate briefly the death-rate, and to compare it with that of England. In 1881 in New South Wales the percentage of deaths among the total average number of the insane was:—Males, 6·76; females, 5·61; a total of 6·32 per cent., reaching, at the end of the decennial period—males, 8·42; females, 5·65; a total of 7·40 per cent.—which latter, with one exception, was the highest of the period, and was due probably to the prevalence of epidemic influenza, either directly or to its complications and sequelæ. In England the death-rate of the insane at the close of the year 1890 was:—Males, 11·45; females, 7·97; a total of 9·57 per cent., or 2·17 per cent. more than that of New South Wales. As might be expected, the rate of mortality among insane persons who suffer from a serious malady is much higher than among the sane, and the difference between the rate in England and New South Wales is largely a matter of climate, insane people being very susceptible to prolonged or intense cold. Besides, lung troubles are much more common in the less temperate latitude of England. Nor does it necessarily follow that insanity itself accounts for the whole of the shortening of life, inasmuch as the circumstances which have induced the malady may have also injured the constitution and curtailed the life of the patient, independently of mental disease.

On the Plea of Insanity in Criminal Trials.

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INTRODUCTION.

DESPITE the many able and exhaustive papers which have been written during the past twenty years with the object of examining, and, if possible harmonising, the notorious differences in standpoint and definition which separate the medical from the legal profession upon the great question of insanity in its legal aspect, the relations between the professions in reference to the point continue eminently unsatisfactory. In Victoria, indeed, the disagreement has reached its climax, and a state of affairs prevails which is practically intolerable. The following extract from the judgment of His Honor the Chief Justice of Victoria, in the Full Court, in *Regina v. Colston*, will show that the legal authorities, whilst adhering to the test laid down by the governing body, are in an attitude of expectancy,—

“We are all familiar,” said His Honor, “with the fact that real difficulty arises in the administration of criminal law, especially in capital cases, from the application of the test laid down by the governing legal authority. But neither medical science nor discussions in the Courts of Law have enabled the Legislature on the one hand, or Courts of Law on the other, to arrive at a test sufficiently accurate in definition and capable of being applied to the circumstances of particular cases, to justify, in my opinion, a Court of Justice in introducing this new test into the administration of Criminal Law. Until this question is further discussed and simplified, and until a greater degree of unanimity is attained by those learned inquirers into the state of the mind in connection with the bodily condition of human beings, which shall enable Parliament or Courts of Justice to arrive at and to lay down a more exact test of insanity than now exists, I think we ought to follow the broad general rule. The doctrine that every man is responsible for his own acts is an extremely important one, and is of the highest importance to any new test correct in its definition and capable of being applied to all cases to which it may seem applicable. Medical science has never done it; the Legislature has never made an attempt to frame such a definition of insanity; no Court of Justice has ever laid it down, and I am not prepared to accept, or to apply in this or any other case, such a general alteration of the accepted and the authoritative rule laid down by the highest Court in Great Britain.”

It becomes the duty of the medical profession, therefore, once again to discuss this great question, and, if possible “arrive at and lay down the more exact test of insanity” which His Honor the Chief Justice desires, and it is as a contribution towards this end that the present paper is written. And, viewing, as we do, the matter from both legal and medical standpoints, we may be able to remove some of the differences which have arisen from confusion in terms and mutual misunderstandings, and to point the way towards the harmony which should unite two different branches of knowledge, for the writers of the present paper are convinced that union upon this point is possible, and that the difficulties which lie between are by no means insurmountable.

HISTORICAL RÉSUMÉ.

In the earliest ages of our legal system none but the most outrageous cases of insanity were recognised as pleas of defence, and what the law required was proof that the accused was in point of mind and intelligence

on a level with the beasts of the field. This narrow view—which Maudsley calls “the wild beast theory”—lasted without contention until the time of Lord Hale, in the seventeenth century. A full extract from Hale will be found in Appendix A. Briefly, it may be said that he recognised what he termed “total insanity” and “partial insanity,” holding, however, that this latter was no excuse for crime. Hence “the wild beast theory” still obtained in the law courts, and we find Mr. Justice Tracey, on Arnold’s trial in 1723, saying,—

It is not every kind of frantic humour or something unaccountable in a man’s actions that points him out to be such a madman as is exempted from punishment ; it must be a man that is totally deprived of his understanding and memory and doth not know what he is doing no more than an infant, than a brute or a wild beast ; such a one is never the object of punishment.

Again, on the trial of Lord Ferrer in 1730 before the House of Lords for having killed his valet, evidence was given to support the defence of insanity, but the Lords threw out the greater part of it. They held that the great test of insanity was the conduct of the party in the common affairs of life ; they said that in the case before them all the acts of the accused were consistent with sanity ; they rejected medical evidence framed upon a moral theory of hypothetical insanity, holding that insanity in a legal sense was not a moral question, but a practical question to be proved or disproved by the testimony of persons who had known and dealt with the party prior to the act.

The next case worthy of mention is that of Hadfield, who in 1800 was tried for having shot at the King. Hadfield had a delusion that he was Jesus Christ and that he would by his death redeem the world. He knew suicide was wrong, so he would not kill himself ; yet, knowing that the act would be a crime, he shot at the King in order that he might be executed. Here the accused knew that his act was legally wrong, but to him it was morally right. He was acquitted, but his acquittal is held to have been due solely to the eloquence of his counsel, Erskine.

The first recorded judicial departure from “the wild beast theory” was made by Chief Justice Mansfield in 1812 on the trial of Bellingham. In this case the prisoner had well marked delusions, and we find that in the course of the trial there was introduced the doctrine of right and wrong in the abstract. To use the words of the learned Judge,—

If a person were capable in other respects of distinguishing right from wrong, there was no excuse for any act of atrocity which he might commit, if suffering from delusions. It must be proved beyond all doubt that at the time he committed the atrocious act he did not consider murder was a crime against the laws of God and man.

It is important to note that the right and wrong was to be looked at from the moral as well as the legal aspect.

This view was subsequently sent to the jury by other Judges, as in Offord’s case (5 C. & P. 168) in 1831, but the practice was not uniform. Thus, in Oxford’s case (9 C. & P. 525), tried in 1840, we have the Judge telling the jury that—

If some controlling disease was in truth the acting power within him which he could not resist, he will not be responsible.

It is from 1843, however, that the present position takes origin in the well-known McNaghten case. McNaghten had delusions that Sir Robert Peel and others were blasting his life ; accordingly he waited for and shot a Member of Parliament named Drummond in mistake for one of their number. On his trial the jury, by direction of the Judge, found him insane ; thereupon the House of Lords put to the Judges a series of hypothetical questions. The answers given thereto have as a matter of practice ever since been almost

universally applied to the defence of insanity in criminal trials in Great Britain and the colonies, and by the decision of the Full Court in the Colston case (August 6th, 1891), they now constitute the law of Victoria in relation to criminal offences committed by the insane.

GENERAL REMARKS ON McNAGHTEN'S CASE.

The questions and answers are to be found in Appendix B. Let us now inquire into their scope and meaning.

In the first place it will be seen that the "wild beast theory" is not alluded to in the answers; although at one time the law, and unaltered by statute, the theory is passed over in silence. Secondly, no further notice is to be taken of the capacity to know right and wrong in the abstract, and with reference to the moral as well as the legal aspect of the crime, as laid down by Lord Mansfield. The Judges seized on a different test. They expressly discarded in their first answer the immorality of the act, and regarded only the illegality. The question to be left to the jury to determine was this:—"Was the accused, at the time of committing the act, of sufficient mental capacity to know the quality and the illegality of the deed?"

A little consideration will show that narrow questions were put to the Judges, and were answered in a still narrower manner. Thus, the questions referred to "persons suffering from insane delusions," and the Judges were asked the law relating to them. This was a specific question; the answer dealt with something still more specific, *e. g.*, "Assuming that your Lordships' inquiries are confined to these persons who labour under such partial delusions only, and are not in other respects insane, we are of opinion, &c." At this point we pause to ask what is the authoritative meaning of the phrase in italics, and also what is the legal definition of the word "insane" used therein.

As a matter of experience, the medical profession will be found denying that madmen exist who "labour under partial delusions only, and are not in other respects insane"; but admitting, for the sake of argument, that they do exist, let us examine the line of reasoning contained in these answers. The Judges have clearly taken the following view:—If a man has a delusion and is not otherwise insane, he should for any act based on the delusion be placed in the same position as if his delusion were an actual fact. Thus, say a madman has a delusion that some particular person owes him five pounds; according to the Judges he should act as if he were owed the money; his clear duty is to seek to recover the money by civil process; if he physically injure the supposed debtor the law holds him fully responsible. "Here," as Maudsley says, "is an unhesitating assumption that a man having an insane delusion, has the power to think and act in regard to it *reasonably*; he is bound to be reasonable in his unreason, sane in his insanity."

Let us illustrate the falseness of this assumption by an analogous process. In the digestion of food there are several organs of the body concerned, each with its special functions; to each we can and do allot its physiological worth. But though each organ has thus its assigned task, we find that disease of one organ will always cause some functional, if not organic, change in the others. Now the brain, by means of its various parts, carries on certain processes which terminate in various acts; part of the result is seen in the conduct of the individual. Can anyone deny to the intricate functions of the brain an essential interdependence such as exists admittedly in the much less complex act of digestion? A moment's thought will enable anyone to see that the

assumption made by the Judges in their answers, to the effect that the influence of one diseased mental function can be eliminated, while the remaining functions act as in health, is completely without warrant.

Again, the law presumes that a madman, if he knows an act to be wrong, can always refrain from doing it. As a matter of experience, medical men know this theory to be utterly and hopelessly false. Yet the Judge, as in the old trials for witchcraft, sends to the jury a false theory; the jury act thereon; the Judge tells the Executive that the prisoner had a fair trial; the law takes its course, and the case is used to prop up the false theory on subsequent trials. *Vires acquirit eundo.*

Further, the answers in McNaghten's case have, in our opinion, been too widely applied by their extension to every defence of insanity. Judges, looking apparently only to answers II and III, have not kept in mind the essentially limited nature of the case on which there arose the necessity to put the questions. Nor have they sufficiently borne in mind the extremely-limited applicability of the replies. "Granted," said the Judges, "the existence of a certain state (delusional insanity), this is the law touching the responsibility for acts done under the influence of delusion." But medical science interprets delusions to connote disease of the brain. The law thus applies a metaphysical test to determine the responsibility of those whom science states to be physically diseased. Most Judges, however, forgetting the important supposition in the questions and answers, apply their metaphysical test even where there is not the slightest evidence of such physical disease forthcoming. Often the defence of insanity rests solely on the nature of the deed; yet the Court allows such a plea, and at once applies the test of responsibility given in McNaghten's case, apparently not seeing that there may be no evidence of insanity to which to apply the test. An act of violence may be the result, it is seldom the proof, of mental disease.

An analogous case will make this clear. A man is injured by falling in a street; he brings an action against the Town Council. Before his case can go to the jury, he must prove certain facts amounting to negligence against the Council. These facts being placed in evidence the Court will tell the jury what is the law of the land in relation to the kind of negligence which the jury may find existed. Unless the plaintiff furnish to the Court external facts to work on the Court will not send his case to the jury. The mere fact that he sustained injury by falling in a street may be the result, it is not the proof, of negligence. He must prove certain other facts. So it should be with the rules laid down in McNaghten's case. Before the jury, by direction of the Judge, apply the legal test therein, there should be satisfactory evidence that the person accused may be suffering from insane delusions. As in negligence so in insanity, the Judge should have extraneous facts on which to place the law. As in negligence so in insanity, the Judge should be able to say that there is no evidence to go to the jury. Where a prisoner has acted, not under the duress of a diseased mind or insane delusion, but from motives of anger, revenge, or other passion, he should not be allowed any claim to be shielded from punishment for crime on the ground of insanity.

McNaghten's case is not a test of insanity. It furnishes a legal test for the responsibility of persons who labour under partial delusions only (whatever that means) and are not in other respects insane. The answers should, we think, be applied only where there is evidence of delusional insanity. It is, we know, a belief among lawyers as a class that there can be no insanity without delusion. Many instances of this belief might be given; two will

suffice:—First: “It is difficult to see how to establish a plea of insanity with total absence of delusion.” (*Reg. v. Layton*, 1849, 4 Cox C.C.). And secondly, in *Reg. v. Townley*, 3 F. & F., 889, we read: “What the law meant by an insane man was a man who acted under delusions and supposed a state of things to exist which did not exist, and acted thereon.” If this be the law, why is it that the Judge repeatedly sends the defence of insanity to the jury, and asks them to apply the legal test when there is no evidence of delusion?

That insanity can exist without delusion is a fact, any legal theory to the contrary notwithstanding. The law has no more right to dispute this fact than it has to repudiate the theory of the circulation of the blood, or the mutual attractions of the sun and planets. We would, therefore, ask this question, which is the converse of *McNaghten's case*: What is the law respecting alleged crimes committed by persons not afflicted with insane delusions, but who are in other respects insane?

LEGAL CRITICISM.

Insanity is, in the eyes of the law, a state of conduct, not a disease of mind or body. This was fully pointed out by the House of Lords on March 11, 1862, when their Lordships said that the introduction of medical opinions and medical theories proceeded on the vicious principle of considering insanity as a disease. The criminal law does not deal with truth (*Sir James Stephen*): it is a practical system for the existing state of society, and certain assumptions are considered necessary for the welfare of society. One assumption is, that knowledge is inferred from the capacity to have the knowledge; hence a person in a position to know a thing must be taken to know it. Every person, also, is presumed to intend the natural consequences of his acts; in every unlawful act malice is inferred. With motives, strictly speaking, the law has nothing to do. The object of the criminal law is to induce persons, sane or insane, to control themselves in certain ways. This it can only do by making the escape of the wrongdoer as difficult as possible. Where a criminal offence is proved against a prisoner, and he seeks to escape punishment on the ground of insanity, the law treats him with no lenient hand; every presumption is against him; he must prove his irresponsibility beyond any doubt. If the jury are in doubt, and if the crime be proved, it is the duty of the jury to convict. The question for the jury is not whether the prisoner was of sound mind, but whether he has made out to their satisfaction that he was of unsound mind. The proof of a positive condition is placed on the prisoner. And such proof should and does rightly press heavily on him.

“The delusions,” said a learned Judge, “which indicate a defect of sanity such as will relieve a person from criminal responsibility are delusions of the senses, or such as relate to facts or objects—not mere wrong notions or impressions, or of a moral nature. The aberration must be mental, not moral, to affect the intellect of the individual. It is not enough that they show disease or a depraved state of mind, or an aberration of the moral feelings, the sense of right and wrong being still, although it may be perverted, yet not destroyed, and the theory of a moral insanity, or insanity of the moral feelings, while the sense of right and wrong remains, is not to be reconciled with the legal doctrine on the subject.”

Regina v. Burton, 3 F. & F., 772.

Seeing that the law is a practical system, the test to be applied when a prisoner seeks to avoid responsibility on the ground of insanity must be one which can be readily and practically made use of by the average jurymen. The community would never allow the conduct of a criminal case to pass into the hands of medical scientists. The continual warfare that rages between

medical men and lawyers as to the plea of the "irresistible impulse" shows the danger which the law fears if it allows any alteration. The plea of impulsive insanity in which medical men, as a matter of experience, thoroughly believe, would, if allowed the position of a legal theory, be used, the law considers, to excuse all crimes for which no adequate motives are apparent. Until medical men are able to draw a distinction between "irresistible impulses" and "unresisted impulses," no legal sanction can, therefore, be given to this doctrine. Never has the legal reason for the existing state of the law been more cogently put than by Rolfe, B., in the case of *Regina v. Allnutt*:—

The witnesses called by the defence had described the prisoner as acting from uncontrollable impulse, and they had made other statements of the value of which it would be for the jury to decide; but he must say that it was his opinion that such evidence ought to be scanned by juries with very great jealousy and suspicion, because it might tend to the justification of every crime that was committed. What was the meaning of not being able to resist an impulse? Every crime was committed under an impulse, and the object of the law was to compel persons to control or resist these impulses. If it was made an excuse for a person who had committed a crime that he had been goaded to it by some impulse which medical men might choose to say *he could not control*, such a doctrine would be fraught with very great danger to society.

Again, in *Regina v. Sonthey*, 4 F. & F. 864, the following remarks by the Judge are to be found,—

The jury must not give themselves up to such testimony, but must exercise their own sense and judgment upon it; some medical men had theories about insanity which if applied generally would be fatal to society. Life could not go on if men who did great crimes were to be deemed insane upon these theories. The standard of sense of responsibility they would put was far too high for human life and human society.

Sometimes, however, the Court is compelled by the logic of facts to recognise the medical doctrine that there are irresistible impulses which characterise insanity. Thus in 1872, at the Lewes Summer Assizes, a prisoner was indicted for the murder of a child whose throat he had deliberately cut; there was no apparent motive; his character was previously irreproachable; there was no evidence of intellectual disorder. In this case Martin B. is reported to have said,—

Under such circumstances it was for the jury to consider whether it would be safe to convict the prisoner of murder. When such impulses come upon men, according to the medical evidence, they were unable to resist them. It would be safe in such a case to acquit the accused on the ground of insanity.

The prisoner was accordingly acquitted.

Many other cases could be quoted showing the varying and contradictory positions taken up by able and learned Judges in their directions to the jury, but we will be content with citing the latest relevant English case, tried only last month,—the Leamington parricide. Mr. Justice Wright took the following line in his summing up. He said:

That many, if not all, criminals belonged to the nervous type, to which also did lunatics, but this was no reason for excusing criminals, though many criminals with insane tendencies might be aware of the nature of the act they committed. It was not enough to show that an insane criminal was aware of this to enable one to say that he was responsible; that in fact, as in this case, a mad man might fully recognise that using a revolver might kill a man, and that for killing another one might be hanged; yet the person shooting might be irresponsible, for in one case he might not be able to resist an impulse, and in another, such as the one under consideration, he might believe he was not doing harm. In fact, if a man's act was the direct outcome of an insane delusion, he ought not to be held responsible for the act. He further pointed out that premeditation and deliberation had nothing to do with the matter.—*British Medical Journal*, August 6th, 1892.

In the light of this summing up, it is evident that in English law, at least, McNaghten's case is not universally applied or accepted. But though English Judges may thus vary in their charges to the jury, in Victoria, by the decision of the Full Court, there must be now applied to every defence of insanity one, and only one, test.

To resume, the community must, it is evident, protect itself by its own methods. The verdict of a lay jury seems to be the only practical method of enforcing such protection, and the tests to be given to the jury must be tests easy to understand and to apply. The law cannot change with every advance of science; but at the same time it should not rigorously adhere to past mistakes which science universally declares to be wrong. But to alter the law based on such mistakes, legislation is necessary—unless the present theory be quietly superseded as “the wild beast theory” was—and such legislation can only be passed by the representatives of the people in Parliament assembled. Until the community demands and obtains such legislation the only course open to the Criminal Courts is to continue present methods and theories, no matter how false they may apparently be. Life and property must be protected, and any case where the legal principle has obviously pressed too heavily, must be left in the hands of the Executive.

The law, we have seen, looks to the conduct of the individual, and pays no attention to the physical basis of insanity. This attitude places the Courts in a difficulty, with regard to alcoholism. Most medical men would say that if a man takes too much alcohol and commits a crime while under its influence, he should not, under any conditions, be allowed to plead his own default as a defence. Up to a certain point the English law agrees with this view; but if the drunkenness be acute, and if it has so affected his mind that he is incapable of distinguishing the wrongful nature of his act, he is thereby exonerated. A man who, under the influence of *delirium tremens*, commits a crime is excused, and is at perfect liberty to continue his drinking bouts and commit more crimes. But were the law to exact a physical condition of disease to which to apply the legal tests of responsibility, no man could plead his own default as a defence. Every man would know that if he wilfully took too much alcohol or other stimulant his self-induced condition would afford no excuse for any acts he might commit.

The decisions of some of the American States on the responsibility of drunken persons are perfectly in accord with medical views. Thus it has been held that no degree of intoxication will excuse a criminal act. It is otherwise in respect of mental unsoundness produced by drunkenness, and remaining after intoxication has ceased. (*Beasley v. Stato*, 50 Alab. 149.) Also in *Shannahan v. Commonwealth*, 8 Bush (Ky.) 413, the Court held that a man who wilfully became drunk was in the same position with regard to his criminal acts as a sober man.

The most apparent difficulty in connection with the legal aspect of insanity, however, occurs in cases of puerperal mania. In most of these cases the woman is aware of the quality of her act, and of its immorality and illegality. She will often tell the medical attendant and others that at the time of the deed she knew she was doing wrong, but she could not help it. The puerperal state is, however, so well known, even to lawyers, that a legal way must be found out of the difficulty without interfering with the cherished legal test. This was accomplished in a recent Victorian case by his Honor the Chief Justice, in his charge to the jury, saying:—

The attention of the jury has been drawn to the fact that there was evidence that she said she knew what she was doing, and that it was wrong. The jury would be at perfect liberty to question whether she gave a truthful account of her actions.

This legal fiction that a puerperal woman may not know what she is doing when she is committing her unnatural act is completely wrong. Experience teaches medical men that she does know.

The verdict of "not guilty on the ground of insanity" is in these and similar cases the outcome of sentiment, and not of a strict application of the legal tests. The capacity to know that some atrocious act is wrong is not a high intellectual test, and it often happens that insane persons in committing the act display an amount of intelligence which is far more than the amount required to know the nature and criminality of the act. Which, for instance, requires a higher intellectual capacity, to be able to read and understand a Police Court summons issued by a neighbour, to secretly buy dynamite and gain access to that neighbour's house at 2 o'clock in the morning, and there injure a particular person by exploding the dynamite, or to know that it would be wrong to thus injure that person? Undoubtedly the former. Yet recently a Victorian jury by their verdict found the latter capacity absent, though the higher capacity actually existed. The prisoner was, without doubt, insane, and yet by a strict application of McNaghten's case she must have been held responsible. But so long as the Judge, whilst narrowing down the deliberations of the jury by giving them the legal test to apply to the case, does not lay his usual stress thereon, so long will juries break away when the legal theory is palpably opposed to the facts in evidence.

It is, however, in the finely-balanced cases that difficulties most arise. Whether a man is insane, and whether his insanity causes his conduct, are purely matters of fact, though sometimes extremely hard to determine. These questions should be for the jury, not for the Judge; but the latter is at present compelled to add to difficulties of fact, by putting before the jury a proposition of law, the authority of which is doubted by many eminent lawyers, the truth of which is completely denied by the whole medical profession. The result in practice often is that the Courts charge one way, and the jury, following an alleged higher law of humanity, find another in harmony with the evidence, acquitting as insane many persons who have destroyed life with a consciousness of the wrongfulness of their acts. Instead, therefore, of the certainty on which the law prides itself there is too much uncertainty in the application of the legal test, and a perusal of the cases will show that an acquittal on the ground of insanity is too often a mere matter of chance, dependent on the predilections of the Judge, or the sentiment of the hour.

Thus it cannot be denied that both test and application are open to legal criticism of a damaging kind. Upon many points much of what we would wish to say has been so well said by Sir James Stephen (*History of the Criminal Law of England*, Vol. II, Chapter XIX) that we venture to quote with the added weight of his authority. He reminds the legal profession, first, of what the answers really are, viz., mere answers to questions put probably without warrant, and answered probably without obligation, rather than "a judgment upon definite facts proved by evidence." Further, by assuming a man to be insane in respect to his delusion only and to be otherwise sane, they leave untouched the difficulty brought forward by medical men "that a delusion of the kind suggested never, or hardly ever, stands alone, but is in all cases the result of a disease of the brain which interferes more or less with every function of the mind, which falsifies all the emotions, alters in an unaccountable way the natural weight of motives of conduct, weakens the will and sometimes without giving the patient false impressions of

external facts, so enfeebles every part of his mind that he sees, and feels, and acts with regard to real things as a sane man does with regard to what he supposes himself to see in a dream." Thirdly, if meant to be exhaustive, they deal only with the question of knowledge, and certainly imply that the effect of insanity (if any) upon the emotions and the will is not to be taken into account, though they do not expressly assert this. Fourthly, he notes their ambiguous terminology. Knowledge, he says, like everything else, has its degrees, yet the degree is undefined, and wrong may mean "either illegally or morally wrong." The importance of the difference in definition is strikingly shown in Hadfield's case. To meet these objections Sir James Stephen takes "wrong" to mean either illegally or morally wrong, and, regarding knowledge and power as the constituent elements in all voluntary action, construes knowledge in its wider sense, as carrying with it the power of self-control. He thus points with no uncertain finger in the direction in which medical science wishes the law to travel, and in which continental and American jurisprudence (*vide* Appendix "C") has already moved. How much more than unfortunate, then, to find that in this new country the Full Court has decided to follow the narrower interpretation, and to regard insanity even at this day "merely as a possible cause of innocent mistakes as to matters of fact and matters of common knowledge," thus, for the first time in legal history, restricting in scope, and at the same time making the law of the land an authority, which Sir James Stephen tells us "deserves to be described as in many ways doubtful." As regards confining insanity to matters of intellect the same Judge speaks as follows:—

The proposition that the effect of disease upon the emotions and the will can never, under any circumstances, affect the criminality of the acts of persons so afflicted, is so surprising, and would if strictly enforced have such monstrous consequences that something more than an implied assertion of it seems necessary before it is admitted to be part of the law of England.

Unfortunately the decision of the Full Court has made it the law of our Colony.

MEDICAL CRITICISM.

To the objections thus advanced against the existing declaration of the law the medical profession adds other serious objections of its own. It finds the legal test the outcome rather of keen legal introspection than of even contemporary science, and unaltered by changes which during the last half century have revolutionised every branch of general as well as medical knowledge. Trying its value by the ascertained facts of mental science, medical men see that the test is based upon a fundamental misconception, in that by dealing with conduct simply as the outcome of intellectual capacity, it ignores the presence and superior power of emotion and volition as factors in the operations of mind. Scientifically considered, the legal test is less than a half test. Nor to us does legal reasoning seem less unsound than legal definition. Looking upon insanity as conduct of a certain character, instead of brain disease which produces such conduct amongst other recognisable results, lawyers seem driven to apply their view of insanity to the particular case somewhat as follows:—A sane man acts in certain ways; the accused has acted in some of those ways; therefore the accused is sane. He may be, but this does not prove it. Again, assuming that a sane man acts in certain ways, the law considers that an insane man can never do what it calls sane things. If the law finds him doing such things it is taken as evidence that he is sane. Medically, of course, we know it is evidence which may be of no value. And even in the interpretation of actions in terms of mental states the

law necessarily acts without proper knowledge, and hence in many instances erroneously. Thus it naturally, but wrongly, assumes that movements of the body which are co-ordinated have necessarily a mental purpose, when they may be simply reflex, automatic, or sub-conscious; a misconception which it shares with all medical students when first introduced to the problems of cerebro-spinal physiology. For this reason also, that any one is regarded as a judge of actions in their relation to intellectual states, the law claims that the evidence of eye-witnesses outweighs that of scientific investigators, though cases have often come within its experience showing that relatives, business acquaintances, legal officials, and even general medical practitioners may be in daily contact with undoubted lunatics for a lengthy period without any suspicion on their part that they are dealing with persons of thoroughly unsound mind.

Again, the legal habit of overlooking the physical basis which exists in insanity, and of regarding simply the conduct of the accused, seems responsible for what Sir James Stephen calls "the surprising proposition with such monstrous consequences," viz., that the effects of insanity upon the emotions and the will need not be taken into account. For we find that lawyers have utterly misconceived the medical view of the irresistible impulse. Competent medical men do not say that an irresistible impulse is complete evidence of insanity, or even any evidence at all, but they do say that impulses, which in the sane may well be resisted, become in the insane too often irresistible. The power of control which is present in a healthy brain is absent in many diseased brains. As Taylor says (*Medical Jurisprudence*, Vol. II, 558), a lunatic may have the power of *distinguishing* right from wrong, but he may not have the power of *choosing* right from wrong. But lawyers rush to apply this test to the conduct of all accused, instead of to the insane accused only, and having misapplied it, they declare it too dangerous to be made use of in Courts of law. "If the law allows this doctrine of irresistible impulse to obtain," they say, "people would commit crimes, and then say they could not help themselves, they were compelled to commit them." Of course this objection would apply unless the law were to do as medical men would do, viz., limit the use of this defence to those in whom there existed some proof of physical disease of the brain.

Again, the ambiguity which is left as to the meaning of the words "knowing right from wrong," and which the law treats simply as a tacit difficulty, is to many a medical witness a perfect stumbling block. It makes the test a jugglery with words, not a matter in which scientific accuracy can be used to assist a jury in difficulties of fact. As well ask a chemist to analyse with variable reagents as to expect scientific conclusions under such circumstances. For knowledge may be simply an instantaneous mental photograph or a thoroughly well recognised, because often registered, impression, in touch with emotion and under control, whilst wrong may be not only legal or moral wrong, but the point of view in the latter case may be as varied as the points of the compass. And yet in any given case who knows what values are being attached to the words used, and whether Judge, jury, prosecution, or defence at any time mean anything like the same thing. True, a man's life or liberty is at stake, but it is only that of a man whom the Crown has undertaken to prove guilty. Again, a decided and definite answer in time is asked to this metaphysical conundrum: Had the accused the capacity of knowing the nature of his act at the moment of committing the crime—though in many cases nothing but an approximate answer is possible; and yet, with a refinement of cruelty, the prisoner has to prove

his insanity under these conditions, and remains in law sane and responsible unless and until that decided and definite answer is forthcoming to the satisfaction of the law.

It is apparently also because the law regards the question as one of conduct that we hear so much of the deterrent effect of the legal test by the wholesome application of its stringency. But such an argument presupposes that one can accurately reason from punishments that do influence the sane to punishments that may influence the insane. Not only must this argument fail on a *priori* reasoning, but it is not borne out by facts. To quote a single conclusive instance. On the very night that the notorious Deeming was being condemned to death in the Criminal Court, a woman, since found to be insane, was deliberately plotting and carrying out a scheme of murderous assault in revenge for some trivial and half-fancied insults. If the law wishes to deter insane persons from acting on their delusions and impulses, it should adopt the most deterrent punishment, and to those who have had actual experience in the treatment of the insane, no punishment, not even summary hanging, can in the rare cases in which the madman fears any punishment at all, compare with incarceration for life in the refractory or criminal ward of a lunatic asylum.

SUMMARY.

We are thus, from the foregoing considerations, able to say, with complete confidence and earnest sincerity, that the legal test for the irresponsibility of the insane is wrong in theory, false in fact, cruel in its metaphysical conception, and unreliable in its practical application. If, however, the law, admitting its errors, asks medical men to supply some new test of irresponsibility capable of general application, it is asking an impossibility. Insanity is not a result of metaphysical definition; it is a matter of physical brain disease. There is no single test of insanity; there can be no single test for the irresponsibility of the insane. Some insane are responsible for certain, if not all, of their criminal acts; others are completely irresponsible; and there are gradations of responsibility varying with the nature of the act and the state of the insane person. Every case must be considered by its own facts. As well might a medical man ask the law to lay down the test for typhoid fever when an area is declared infected, and when all cases occurring therein must be reported under penalty of a fine.

"The falseness of the legal position," says Maudsley, "will appear at once, if we suppose a case of poisoning instead of a case of mental derangement. What would be thought of a Judge who, when medical evidence of poisoning was given, should instruct the jury as a principle of law that they must be governed in their verdict by the presence or absence of a particular symptom.

"If the tests of insanity are matters of law, the practice of allowing experts to testify what they are should be discontinued. If they are matters of fact the Judge should no longer testify without being sworn as a witness and showing himself qualified to testify as an expert. (Judge Doe, State of New Hampshire *v.* Pike.)

"But, in truth, the tests of insanity are no more matters of law than are the tests of a poison or the symptoms of a disease.

"If a jury were instructed that certain manifestations were symptoms or tests of consumption, cholera, congestion, or poison, a verdict rendered in accordance with such instructions would be set aside, not because they were not correct, but because the question of their correctness was one of fact to be determined by the jury upon evidence. (Boardman *v.* Woodman, State of New Hampshire.)"

Dispassionate thought must convince anyone that there can be no single test for the irresponsibility of the insane. The absence of a knowledge of right and wrong, the inability to control one's impulses, the want of design in planning some act, the lack of cunning in escaping from justice, the failure to recognise acquaintances, the unfitness to transact business, not one of

these is a sure test. All tests of insanity and of responsibility therefrom are purely matters of fact which should in each case be determined by the jury, and not laid down by the Court.

LEGAL PROCEDURE AND MEDICAL EVIDENCE.

Many of the present unsatisfactory results in dealing with cases of insanity must be ascribed to the legal procedure adopted. So long as any medical man can enter the witness-box and, after stating that he is legally qualified, proceed to give any opinion he thinks fit, so long will the dissatisfaction continue. At present the Court allows any medical man to appear before it, but has no recognised means of properly weighing his testimony and views. So many considerations enter into the question of a medical man's capacity to form opinions and to give evidence that it would be invidious and perhaps impossible to lay down any fixed qualifications for an expert witness. But reform can be urged in the direction of the appointment of medical assessors to assist the Court, either by giving evidence on oath during the case or else by stating from the Bench what conclusions the jury might reasonably draw from the medical facts in evidence. The Judge at present tells the jury what conclusions they may draw from the whole evidence, surely a medical assessor might be allowed to tell the Court what scientific conclusions it would or would not be safe to draw from the medical evidence. It may be said that the jury would often ignore the medical assessor. Doubtless they would, but they would have before them every opportunity of forming correct verdicts. Too often as it is, juries pointedly disregard the direction of the Judge, but no one would think for that reason that Judges or juries are not required. As a matter of fact medical opinions are not uncommonly advanced which are completely opposed to all established medical beliefs, and the Court has no means of determining their value. And considering that in the Marine Court nautical assessors have been appointed who aid the presiding magistrate; that in patent cases an assessor can be and often is called on under the Act to assist the Court, and that in the Supreme Court Act, section 172, the Judge can under certain conditions obtain expert opinions, it is not asking too much that in matters of life and death or of liberty the Criminal Courts should be placed in the best position wherein to judge of the absolute and relative value of evidence.

Again, the presentation of the medical evidence is frequently unsatisfactory, partly from the difficulties of the situation, but still more from the manner in which it is obtained. For in the "trial by combat" which a legal case still remains, the medical evidence is treated by counsel *pro* and *con* entirely from the party point of view. The examining barrister takes what he wants and no more: the cross-examiner seeks to elicit just that portion which suits his brief. And the result is that it is rare indeed that the medical witness is satisfied with his evidence, or that its presentation is otherwise than unnecessarily blurred and distorted.

Stress also must be laid on the unwarranted manner in which both Judge and counsel too frequently deprecate the value of the medical evidence. Although the law has by metaphysical speculation evolved the present legal test from its own inner consciousness, the initial attitude of the Courts towards medical witnesses is too often that of the learned Judge, who in his charge to the jury spoke as follows:—

"Learned speculators have laid it down that men with the consciousness they were doing wrong were irresistibly compelled to commit some unlawful act. But who enabled them to dive into the human heart and see the real motive that prompted the commission of such deeds? *Reg. v. Stokes* C. & P. 185."

It is true that medical men, being human, are liable to errors of judgment and to differences of opinion, and there are no grounds for wonder, especially under the circumstances if their evidence is often more or less contradictory. But lawyers exist as a class only because they see differences in the same occurrences, and Judges are found frequently disagreeing upon points apparently less recondite than the mental state of an alleged lunatic. Thus in *King v. The Victorian Railway Commissioners*, three Judges had to decide the comparatively simple question, "Is the putting of the head out of the window of a railway carriage, in motion, a reasonable use of the carriage?" with the result that two said, "Yes" and one said, "No." Again, four Judges dealt with the filing of a Bill of Sale in *Danby v. The Australian Finance and Guarantee Company*. That the Bill was good, three Judges held, one for reason (a), one for reason (b), and one for reason (c), each seeing nothing in the reasons of the others, whilst the fourth Judge held that the Bill was bad, none of the reasons being, in his opinion, satisfactory. Another instance even more suggestive is that of *Vagliano v. The Bank of England*. After passing through two Courts in favour of Vagliano, the case was decided by the House of Lords in favour of the Bank by six to two, no two of the majority agreeing as to their reasons. Despite this conclusion, we find on counting heads in all the Courts that Vagliano had eight Judges in his favour, and seven against him; yet he lost his case. We do not adduce these instances of differences of opinion, even in the seat of authority, for any purpose of depreciation or undue magnification, but, because, owing to unfair legal usage it has become necessary to show that there is as much reason to say, "don't attach any weight to the presiding Judge's opinion," as to say, "A mere doctor's opinion is worth nothing," and yet whilst the former is a mistake into which medical men never fall, the latter is an unfairness of which the Court frequently avails itself. In each case the proper course is to give the opinion the value which it deserves, and if in the case of the Judge it is the law which has to be unfolded, it must not be forgotten that in the case of the medical witness it is the scientific *status in quo* which he has to portray.

SPECIAL DISABILITIES IN VICTORIA.*

Unfortunately, we in Victoria labour under disadvantages peculiar to the Colony. It has been already shown how the decision of the Full Court in the Colston case has made the law in reference to insanity far more restricted than it is in any other part of the Empire.

It is, of course, only right that the prosecution should have all the time, money, and opportunities necessary to the proper presentation of their case. It may also be conceded that there are reasons more or less strong, why the defence should at times work through legal opposition and emptiness of pocket, as well as public odium. But is there any excuse for unfairness? And yet to quote from what occurred in the Colston case,—

The Crown may and does examine the accused when and how it chooses, and the opinions, &c., so obtained, may be and are used against him, whilst his own medical witnesses are not allowed any such privileges, and are even unrepresented, whilst important evidence is being obtained. *Australian Medical Journal*, 1st December, 1891.

Again, the Court has acted as if it were sufficient for the law to be, as the Judge said on a recent memorable occasion, "swift and sure." Thus the

* Dr. Springthorpe takes the responsibility of this subsection.

medical witnesses for the defence in the case referred to (that of Deeming) felt themselves constrained to complain to the *British Medical Journal* that the trial had been too hasty for a proper judgment.

Not unnaturally, we were not prepared to go into the witness-box on the morning following our last examination, and give an expert opinion upon such a case, especially since in addition to the statements of the prisoner, we had found on him signs of blows upon the head with more or less depression, a seton mark at the back of the neck, and large syphilitic scars upon the limbs and trunk. In addition, his eyes had not been thoroughly examined by anybody, and in reply to our inquiry we had received a telegram from the governor of the Sydney Gaol to the effect that the accused had been treated in the gaol hospital for epileptic fits, whilst his extreme restlessness was a notorious fact, and there was no evidence of alcoholic excess. Further, his statement as to the presence of lunacy in the family, and his apparent hallucination as to the appearance of his mother had already been verified by cable in a remarkable manner. We, therefore, asked for an adjournment, and from the importance and intricacy of the case, went to the extent of declining to give evidence if a postponement were refused. Despite this, the strongest protest that we could make, the trial was proceeded with, and we were compelled upon subpoena to give such evidence as we had collected.—*B. M. J.*, July 9th, 1892.

In the Colston case, where the Crown medical witnesses wished for delay for purposes of further investigation, the defence readily applied for such delay by arrangement; yet in the Deeming case, where the defence had at least equal reasons for being unprepared to proceed, the prosecution strenuously and successfully opposed any adjournment.

Lastly, the Crown has, for the present at all events, extinguished the possibility of any scientific verification in cases of dispute. So long as a post-mortem examination was permitted, so long could the medical witnesses *pro* and *con* be brought face to face with their diagnoses in the way considered satisfactory in other cases of disputed opinion, and science gained whoever was right or wrong. But in our two most recent cases of disputed insanity the Crown has altered the previous custom and peremptorily declined to allow of such examination. The Crown witnesses who know full well the attitude and weight of the Crown, and who already have everything in their favour, are thus practically told "whomsoever you declare to be sane shall never be found post-mortem to have anything the matter with his brain," whilst science, which has found a distinct connection between insanity and brain disease, is thus denied the means of collating facts upon which to build the fuller science of the future.

CONCLUSIONS.

Matters being thus eminently unsatisfactory from every point of view, the practical question remains: Is reform possible? This paper concludes with an attempt to show that something can be done, and to suggest ways and means.

A very great improvement in the presentation and valuation of the medical evidence can be effected by adopting the procedure already suggested.

Dealing with the all-important questions of standpoint and definition, we would urge that in every case the existence of insanity and of irresponsibility arising therefrom should be matters of fact for the jury. At present the law by its test prevents material evidence upon both these points from being properly considered by the jury. Instead of regarding insanity as a matter of conduct, the only practical way of dealing with it, in our opinion, is to look upon it as a disease of the brain. And defining it for legal purposes

as "a disease of the brain, affecting the intellect, the emotions, and the will, not immediately induced by the default of the individual," there would then be two questions of fact for the jury to determine,—

1. Has the accused such disease?
2. Is the crime the outcome of that disease?

By such procedure all material evidence might be considered by the jury, the law would lose nothing which it should conserve, and at the same time it would come into harmony with legal advance in other countries, and with medical science throughout the world.

The two questions suggested are in themselves simple, and such as any jury can readily understand and apply. Any difficulties that may arise will be due to the intricacies of the particular case. Not only are the questions simple, but they are essentially the questions which should be determined in relation to the alleged crime. For it must be admitted that an insane person may commit a criminal act which is in no apparent way the outcome of his diseased mental functions; such a one would, however, be still held responsible for the legal presumption that every man is both sane and responsible until the contrary be proved to the satisfaction of the jury remains as strong as ever. Again the present procedure of applying a false metaphysical test of responsibility to the accused's conduct would no longer be allowed; facts indicating insanity as a disease would have to be in evidence before the jury could consider the question of irresponsibility at all. Further, the doctrine of the irresistible impulse on which, as we have shown, even Judges sometimes seize, could be applied only to those cases of actual insanity of which in the opinion of the jury it was the characteristic feature. From a medical point of view, also, in each case, instead of the testimony being directed to prove insanity (a very wide term) the symptoms and characteristics of the particular brain disease from which the accused was alleged to be suffering would have to be put before the Court, and this, by restricting the scope of medical inquiry and legal examination, would render more accurate the evidence adduced.

In addition, Judges and juries would be free from the difficulties in which they at present find themselves when called upon to deal with such cases as puerperal mania and the like, wherein both recognise that the accused was palpably insane when committing the act although aware of its nature and illegality.

That mistakes would occasionally occur even under these altered conditions is not disputed, since error is inseparable from human procedure, but they would be mistakes due to unavoidable misinterpretations of facts, not to false theories embodied in legal propositions.

APPENDIX A.

Extract from Hale.

Hale divided irresponsibility into that of infants and of those *non compos*; if infants, the question is whether they can discern good from evil.

Lunacy he deals with under two heads—*Idiocy* and *Dementia accidentalis* or *adventitia*. The latter, he says, proceeds from several causes, sometimes from the temper of the humours of the body as deep melancholy or cholera, sometimes from disease as fever or palsy, sometimes from concussion or hurt of the brain, and as it comes from several causes, so it is of several kinds or degrees which may be thus distributed:—

1. Partial insanity of the mind.
2. Total insanity.

The former is either in respect of things *quoad hoc vel illud insaneri*; some persons would have a potent use of reason in respect of some subjects, yet are under a partial delusion in respect of some particular discourse, subjects, or applications, or else it is partial in respect of degree, and this is the condition of very many, especially melancholy persons who for the main part discover their defect in expressive fears and griefs, and are yet not wholly destitute of reason.

This partial insanity seems not to excuse them in the committing of any offence; for doubtless most persons that are felons are under a degree of partial insanity when they commit these offences. It is very difficult to define the indivisible line that divides perfect and partial insanity; but it must rest upon circumstances duly to be weighed by the Judge and jury; lest on the one side there be a kind of inhumanity towards the defects of human nature, or on the other side too great an indulgence given to great crimes. The best measure I can think of is this: such person as is labouring under melancholy distempers yet hath ordinarily as great understanding as ordinarily a child of fourteen hath is such a person as may be guilty of treason or felony.

Accidental dementia, whether total or partial, is distinguished from that which is permanent and fixed, and that which is interpolated by certain periods and vicissitudes; the former is madness, the other is lunacy. As for lunatics their responsibility varies with the measure or degree of their distemper.

As to criminals these *dementes* are both in the same rank; if they are totally deprived of the use of reason they cannot be guilty ordinarily of capital offences for they have not the use of understanding, and are not responsible creatures.

Hence, according to Hale, total loss of reason must be proved for a defence.

APPENDIX B

McNaghten's Case.

Question I.—What is the law respecting alleged crimes committed by persons afflicted with insane delusions in respect of one or more particular subjects or persons; as for instance, where at the time of the commission of the alleged crime the accused knew he was acting contrary to law, but did the act complained of with a view, under the influence of insane delusion, of redressing or revenging some supposed grievance or injury, or of producing some supposed public benefit?

Answer I.—Assuming that your Lordships' inquiries are confined to those persons who labour under such partial delusions only, and are not in other respects insane, we are of opinion that notwithstanding the accused did the act complained of with a view, under the influence of insane delusion, of redressing or revenging some supposed grievance or injury, or of producing some public benefit, he is nevertheless punishable according to the nature of the crime committed, if he knew at the time of committing such crime that he was acting contrary to law, by which expression we understand Your Lordships to mean the law of the land.

Question II.—What are the proper questions to be submitted to the jury when a person, afflicted with insane delusions respecting one or more particular subjects or persons, is charged with the commission of a crime (murder for instance) and insanity is set up as a defence?

Question III.—In what terms ought the question to be left to the jury as to the prisoner's state of mind at the time the act was committed?

Answers II and III.—As these two questions appear to us to be more conveniently answered together, we submit our opinion to be that the jury ought to be told in all cases that every man is presumed to be sane and to possess a sufficient degree of reason to be responsible for his crime until the contrary be proved to their satisfaction. That to establish a defence on the grounds of insanity it must be clearly proved that at the time of committing the act the accused was labouring under such a defect of reason from disease of the mind as not to know the nature and quality of the act he was doing, or if he did know it, that he did not know that he was doing what was wrong. The mode of putting the latter part of the question to the jury on these occasions has generally been whether the accused at the time of doing the act knew the difference between right and wrong; which mode, though rarely if ever leading to any mistake with the jury, is not, we conceive, so accurate when put generally and in the abstract as when put with reference to the party's knowledge of right and wrong in respect to the very act with which he is charged. If the question were to be put as to the knowledge of the accused, solely and exclusively with reference to the law of the land, it might tend to confound the jury by inducing them to believe that an actual knowledge of the law of the land was essential in order to lead to a conviction; whereas the law is administered on the principle that

every one must be taken exclusively to know it without proof that he does know it. If the accused was conscious that the act was one which he ought not to do, and if that act was at the same time contrary to the law of the land, he is punishable, and the usual course, therefore, has been to leave the question to the jury, whether the accused had a sufficient degree of reason to know he was doing an act that was wrong, and this course we think is correct; accompanied with such observations and corrections as the circumstances of each particular case may require.

Question IV.—If a person under an insane delusion as to existing facts commits an offence in consequence thereof, is he thereby excused?

Answer IV.—The answer must of course depend upon the nature of the delusion, but making the same assumption that we did before, namely, that he labours under such partial delusion, and is not in other respects insane, we think he must be considered in the same situation as if the facts with respect to which the delusions exist were real. For example, if under the influence of his delusion he supposes another man to be in the act of attempting to take away his life and he kills that man, as he supposes in self-defence, he would be exempt from punishment. If his delusion was that the deceased had inflicted a serious injury to his character and fortune, and he killed him in revenge for such supposed injury, he would be liable to punishment.

APPENDIX C.

Foreign Law on Insanity.

In France the penal code says: There can be no crime nor offence, if the accused was in a state of madness at the time of the act.

In Germany the following section, being the formulated result of discussions by physicians and lawyers, is included in the penal code:—"An act is not punishable when the person at the time of doing it was in a state of unconsciousness or of disease of the mind, by which a free determination of the will was excluded."

In New Hampshire, U.S.A., the English test has been judicially described as "an interference with the province of the jury, and the enunciation of a proposition which, in its essence, is not law, and which could not in any view be safely given to the jury as a rule for their guidance, because for aught we know it may be false in fact." *State v. Jones*.

In *Stevens v. the State of Indiana*, the instruction to the jury to apply *M'Naghten's* case was held to be erroneous.

In the *State of New Hampshire v. Jones*, 50 N.H. 369 IX 242, Judge Ladd thus alludes to *M'Naghten's* case:—

The doctrine thus promulgated as law has found its way into the text-books, and has doubtless been largely received as the enunciation of a sound legal principle since that day. Yet it is probable that no ingenious student of the law ever read it for the first time without being shocked by its exquisite inhumanity. It practically holds a man, confessed to be insane, accountable for the exercise of the same reason, judgment, and controlling mental power that is required in perfect mental health. It is, in effect, saying to the jury, the prisoner was mad when he committed the act; but he did not use sufficient reason in his madness. He killed a man because, under an insane delusion, he falsely believed the man has done him a great wrong, which was giving rein to a motive of revenge, and the act is murder. If he had killed a man only because, under an insane delusion, he falsely believed the man would kill him, if he did not do so, that would have been giving the rein to an instinct of self-preservation, and would not be crime. It is true in words the Judges attempt to guard against a consequence so shocking as that a man may be punished for an act which is purely the offspring and product of insanity, by introducing the qualifying phrase, "and is not in other respects insane." That is, if insanity produces the false belief, which is the prime cause of the act, but goes no further, then the accused is to be judged according to the character of motives which are presumed to spring up out of that part of the mind which has not been reached or affected by the delusion or the disease. This is very refined. It may be that mental disease sometimes takes a shape to meet the provisions of this ingenious formula; or, if no such case has ever yet existed, it is doubtless within the scope of Omnipotent power hereafter to strike with disease some human mind in such peculiar manner that the conditions will be fulfilled; and when that is done, when it is certainly known that such a case has arisen, the rule may be applied without punishing a man for disease. That is, when we can certainly know that although the false belief on which the prisoner acted was the product of mental disease, still that the mind was in no other way impaired or affected, and that the motive to the act did certainly take its rise in some portion of the

mind that was yet in perfect health, the rule may be applied without any apparent wrong. But it is a rule which can safely be applied in practice that we are seeking. And to say that an act which grows wholly out of an insane belief that some great wrong has been inflicted is at the same time produced by a spirit of revenge springing from some portion or corner of the mind that has not been reached by the disease, in laying down a pathological and psychological fact which no human intelligence can ever know to be true, and which, if it were true, would not be law, but pure matter of fact. No such distinction ever can, or ever will, be drawn into practice; and the absurdity, as well as the inhumanity, of the rule seems to me sufficiently apparent without further comment.

. It is a question of fact what that test is, if any there be.

The following extracts from the *State of Alabama v. Parsons*, LX., American Reports, 193, are well worthy of note :—

The result is, that the right and wrong test, as it is sometimes called, which, it must be remembered, itself originated with the medical profession in the mere dawn of the scientific knowledge of insanity, has been condemned by the great current of modern medical authorities, who believe it to be founded on an ignorant and imperfect view of the disease.

The question then presented seems to be whether an old rule of legal responsibility should be adhered to, based on theories of physicians promulgated a hundred years ago, which refuse to recognise any evidence of insanity except the single test of mental capacity to distinguish right and wrong; or whether Courts will recognise as a possible fact, if capable of proof by clear and satisfactory testimony, the doctrine now alleged by those of the medical profession who have made insanity a special subject for investigation, that the old test is wrong, and that there is no single test by which the existence of the disease to that degree which exempts from punishment can in every case be infallibly detected. The inquiry must not be unduly obstructed by the doctrine of *stare decisis*, for the life of common law system and hope of its permanency consist largely in its power of adaptation to new scientific discoveries and the requirements of an ever advancing civilisation. There is inherent in it the vital principle of juridical evolution.

The existence of such a cerebral disease—one which so affects the mind as to subvert the freedom of the will and thereby destroy the power of the victim to choose between right and wrong, although he perceive it—is entirely alleged by the superintendents at insane hospitals and other experts who constantly have experimental dealings with the insane, and they are permitted every day to so testify before juries. The truth of their testimony, or, what is the same thing, the existence or non-existence of such a disease of the mind in each particular case is necessarily a matter for the determination of the jury from the evidence.

The practical trouble is for the Courts to determine in what particular cases the party on trial is to be transferred from the category of sane to that of insane criminals; whether, in other words, the border line of punishability is judged to be passed. But no one can say where twilight ends or begins, yet there is ample distinction between day and night. We think we can safely rely in this matter upon the intelligence of juries, guided by the testimony of men who have practically made a study of the disease of insanity and enlightened by a conscientious idea on the one hand to enforce the criminal laws of the land, and, on the other hand, not to deal harshly with any unfortunate victim of a disease of the mind acting without the light of reason or the power of volition.

Idiocy and Juvenile Insanity in Victoria

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For many years no distinction was made in Victoria between idiots and insane persons, both were, when necessary, committed to the same institutions, on the same warrants, and no special methods were used in these institutions for developing, and strengthening the feeble faculties of the first-named class. Some of the brighter imbecile boys found employment on the Asylum farms, and a few of the girls helped in the house-work, the greater number mixed in the wards and airing-courts with the adults, learning obscene words, and vicious habits. Little or nothing could be done under such circumstances for training and education. Though the subject was often under consideration, it was not till 1886, that any active steps were taken to form a separate institution for feeble-minded children. In that year three cottages, a school, and play-rooms, with kitchen and out-buildings were erected on the grounds of the Kew Asylum, thus providing accommodation for sixty children, and these were opened for use on the 19th of May, 1887, by the transfer of children from the adult asylums. This transfer of patients though necessary, brought many elder idiots into the new institution, and increased the difficulty of beginning their training on proper lines. The staff was made up of attendants appointed for the general work of the department, and who disliked the work, for which, indeed, they had neither training nor aptitude. Fortunately a head-teacher, who had been employed for eight years at the Royal Albert Institution in the north of England, was obtained, and so we were able to start in the right direction. After a time it was arranged that all appointments should be made direct to the Idiot Asylum itself in place of drawing from the general staff of the department, and this was found to be a marked improvement. Three additional cottages have since been added, making in all accommodation for 120 children. It will be seen that our institution consists of a number of detached buildings. No advantage has resulted from this arrangement, the cottages being more costly than blocks, they are difficult to work, and less comfortable for the children. A separate place for feeble-minded children was a new departure in Victoria, and it was determined to carry it on, as far as possible, on the same lines as those in England. The first principle, therefore, was, to admit only idiots and imbeciles, and not to receive any adult insane. The second, to work it as a training school, in which the physical, mental, and moral powers of the inmates would be developed, and not to regard it merely as an asylum for the safe keeping of the patients. Admission is obtained in the same manner as to the adult asylums, either by transfer from the industrial schools—when the children are regarded as criminal lunatics—or by the public or private admission forms, when the little patients are certified as being insane. It is painful to many families to have a weak-minded child called insane, and I have known instances of medical men objecting to sign these certificates, not regarding weak-mindedness as insanity. It also seems a tax on poorer class people to employ two doctors, and in remote country places it is not always easy to get

them. For these and other reasons it would seem wise to adopt a special simple form, with one medical certificate, both order and certificate to describe the child as feeble minded, and requiring care and control, such special warrant only to apply to persons under 21 years. The advantages of getting children into the school at an early age cannot be overrated, the mind and body are then plastic, and respond to training in a manner they do not in after years. Many of the children transferred from the adult asylums at the opening of this institution were past the most promising age, and even among the new admissions the most favourable years are too often allowed to pass before skilled aid is thought of. The advantages of a special training school over home education in cases of idiocy do not, in my opinion, admit of any doubt. If the home is poor such a child may be fed, clothed, and some attempt made to teach decent habits, but there is neither time nor knowledge to draw out the feeble glimmering of mental life. If there are other children in the family of natural intellect they often tyrannise over and degrade the weak one, and may themselves suffer by the companionship. Even in wealthy families home training does not generally turn out a success. Instances have often come under my notice of idiots who have been reared with every care that affection could suggest or money procure, and the result has been degraded habits, violent temper, and an undeveloped mind. I therefore have no doubt that a training institution, carried on like the Royal Albert, gives the best possible results, and humanises as far as may be, beings who are often more degraded than beasts of the field. To obtain the full advantage, the children should be sent early, and allowed to remain till their training and education are finished. The best means of providing for grown-up idiots presents many difficulties. It is not desirable they should continue all their lives in the training institutions, both on the ground of cost and that a number of adult idiots and imbeciles would tend to change it from a school into an asylum. When they are grown up a few of the dangerous—mostly epileptics—might have to be sent to a lunatic asylum. Some of the better ones would naturally live with relations, helping towards their own support by the trades they had learned in the institution. Still many will grow up that should not be sent to lunatic asylums and have no homes to go to. A special ward in a benevolent asylum, where they could find employment, and some, not too costly, supervision, would seem, for the present at least, to offer the best means of solving the difficulty. The English idiot schools select those children that seem most hopeful as to mental improvement. This must give better returns than if all degrees of mental enfeeblement were admitted. The Victorian institution being supported by the State, must receive all classes of children, and this has to be kept in mind in judging our results. We have at present 117 children; thirty-one of these are epileptic. And here, as elsewhere, the epileptics are the most disappointing cases. They are often bright for a time, and improve mentally and physically, under careful diet and medical treatment, but the fits return and all improvements seem swept away, leaving us to begin the work anew. As the tendency in epileptic children, as in epileptic adults, is towards dementia, the possibility of mental advance is confined to narrow bounds. Still, even in these, many can be taught simple trades even when the higher faculties cannot be cultivated.

The education of feeble-minded children naturally divides itself into four parts—physical, mental, moral, and learning trades; but although special means have to be devised and carried out for the advancement of the children in each of these directions, still it is found that anything which develops one part of their nature, also helps towards advancing the others.

It is not necessary to say that all pupils do not develop in the same way, one may make but little mental advance, while his physical and moral progress will be considerable; or a boy who is slow at school work may learn mat-making with but little trouble. On examining all the children in our institution, I find that two-thirds have clearly improved. The means used for physical training are the same as in the English schools—light dumb-bells, marching in order, walking on ladder steps, general drill movements for the arms and body, with out-door work in the garden for the boys, and laundry work for the girls. The mental faculties are developed in the school, marked improvement being obtained in writing. A few have learned to read simple words; colour, clock, and shop lessons have been found useful, and many of the children can join in simple tunes, which give them much pleasure. The moral training includes cleanly habits, and here very satisfactory progress has taken place,—many of the children who were wet and dirty are now clean—and also includes proper behaviour at meals, and self-control. The conduct of the boys at meals is now generally satisfactory: they come into the dining-room in an orderly manner, take their places; stand up till grace is said, and then eat their food with knives and forks or spoons. Some of these when first admitted acted at meal times more like wild beasts than human beings. The school has only an easily scaled fence round it, and at first there was much trouble caused by some of the boys escaping; self-control has now been so well developed in them that they can be trusted outside the fence by themselves without any fear of their running away; at the same time they are very glad to be taken out for a few days by their friends. Bad language is seldom heard, and sexual vices are kept within a very limited compass. Sixty per cent. of the children can say the Lord's prayer, and 80 per cent. attend simple religious services. As we had no trained teachers of trades the starting of this branch caused much trouble, and it was only last year we were able to make a proper beginning. Fourteen boys are now engaged making door-mats; we find we can now supply all the institutions with these articles. Basket-work was more difficult to learn, but a considerable number of baskets, chairs, couches, &c., have been made. We also hope before long to add brushmaking to our list.

Though special instruction is needed in each division of training, still there must be a general unity of aim underlying all education, so as to insure general progress, and to develop all the faculties and powers of the children. In arranging the work and physical training, it has to be remembered that all idiots and many imbeciles are markedly below the normal standard of bodily health. Taking our girls over fourteen, one-third of them do not menstruate at all, and half of those that do are irregular as to time and quantity of the discharge. In almost all the children the reflexes are feebly marked. In many of them the temperature is subnormal, and this is very marked before they get out of bed in the morning, owing, perhaps, to the absence of food for many hours. In short, all bodily, as well as mental functions, are discharged in a slow and feeble manner, or in other words, the enfeeblement is not confined to the higher brain centres, but extends to every structure of the body.

Little notice seems to have been taken of juvenile insanity, but when we examine into the histories of feeble-minded children, we find that some passed through the early years of childhood without betraying any symptoms of mental weakness. When injury or disease, after about the end of the fourth year causes mental alienation, such cases should, I think, be called juvenile insanity, and not idiocy. We have had three patients in whom epilepsy seems

to have caused dementia, and these do not in any way differ from epileptic dementia in the adult, and are hopeless for any marked improvement. A boy, aged about 6 years, got a fall; shortly afterwards he lost all power of speech, and became dull and stupid. No injury to the skull could be detected; under careful training for eighteen months he relearned the use of words, and was able to express himself fairly well; his mental powers were also brightening up to a very marked degree. He was then removed home, and I afterwards learned was attending a State school and making fair progress. Another boy was described as being bright and active up to about 13, and was employed as a cash boy in a large shop; paralysis first appeared in both thumbs, afterwards invading the legs, and other parts of the body. When admitted he could walk, but with long uncertain strides; he had but little power over his hands; mentally he was dull, but could understand and answer questions; the most marked symptom was an almost complete absence of spontaneity; if left to himself he would do nothing, remaining standing or sitting as he might chance to be left, but he would carefully carry out orders, even though these orders required work to be done extending over several hours. He is now much improved, both mentally and physically, though there is very little spontaneous action of any kind. These give a fair idea of the cases of juvenile insanity that have come under notice.

Many persons do not understand what is to be expected from a school of this nature. They ask, Can the children be cured?—that is, brought up to the natural standard; and when told we have no hope of doing so, they say, “What is the use of troubling about them—better they were all dead.” Now, what we do expect to be able to do, is to improve more or less most of the children sent to our care, to make them as like human beings as possible, to train some so as to enable them to help in their own support; and there may be a few cases in which it is possible to develop latent powers so as to bring the patients nearly in line with more fortunate beings.

Clinical Notes on a Case of Hydrocephalic Idiocy.

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IN this paper Dr. Steell contributed a complete and interesting record of a case of hydrocephalic idiocy which had fallen under his observation, in concluding which he remarks :—

In connection with this case, it is interesting to note the small amount of paresis that remained after a very large quantity of fluid had been exuded into the cranial cavity, which must have exercised considerable pressure on the brain substance. The intelligence under ordinary circumstances of such a case, which at first onset seemed to be almost hopeless, is remarkable and instructive, as showing how amenable to discipline some of the feeble-minded are, and I am sure that had this patient been sent to a training school for idiots and imbeciles at an early age he could have been much more highly educated than he was, and might have been able to divert his mind into some groove which would have proved of such interest to him that had he been left undisturbed to follow his bent there would have been no necessity for the restraint at present imposed. It is also exceptional to find a person in a similar state of mind to this patient, who is fond of animals, and liked by them, for, as a rule, idiots and imbeciles, who are fairly sensible, are cruel and mischievous, and take a delight in maltreating any animals that may be unfortunate enough to get within their reach, and they are generally cowards, and markedly afraid of water, and will not willingly go into it, while this patient certainly was not afraid of horses, and was fond of bathing.

Premonitory Symptoms of General Paralysis of the Insane.

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IN this paper, Dr. Rosenblum, after citing the views of Meynert (*Psychiatrie*), Savage, Voisin, Spitzka and others, and pointing out the importance of recognition of early symptoms, says:—

What are the symptoms that we may regard as premonitory? I have carefully investigated the history of forty-three cases of general paralysis, antecedent to their committal to an asylum, with the following result:—In twenty-one cases there had been no premonitory symptoms observed or complained of, or there was no reliance to be placed in the accounts given. In the remaining twenty-two the symptoms were:—Migraine, frequently occurring and preceding the advent of insanity for long periods in three cases. The migraine was associated with dimness of vision, which preceded it, and to which it was attributed. During the acme of the attacks of migraine there was the subjective sensation of light of dazzling intensity. Periodical dimness of vision occurred in two other cases. Variations in the size of one or both pupils in four. Hemicranial headache in three; general headache, usually accompanied by a feeling of tightness or pressure, in six. In two cases of more or less localised headache its intensity and persistency had led to the diagnosis of brain tumour. Vertiginous or syncopal attacks occurred in five cases. In these there was dizziness, with more or less complete loss of consciousness. Hesitation and difficulty of speech, noticed for long periods, before insanity was suspected, or noticeable change of disposition or conduct in four. In one case transient attacks of aphasia. Tremor was observed in one. Sleeplessness, as might have been expected, was very general, and was usually accompanied by great restlessness. Markedly increased sexual excitability for twelve or eighteen months before admission to the asylum was present in eleven cases, whilst in one man aged 38 sexual power was abolished. Repeated slight convulsive attacks occurred in four cases, and in one an epileptiform attack during the sexual orgasm. Marked muscular weariness on slight exertion in three. Fleeting neuralgiae in seven. Formication of the skin of the lower extremities in one. Sudden muscular spasms and startings of the limbs, especially when at rest, in four. Loss of memory of a temporary nature occurring at irregular intervals and diminution in power of attention were observed and commented upon by the patients themselves in two cases long prior to the occurrence of established general paralysis. In one of these cases the declared insanity followed a few days after the occurrence of an apoplectiform attack, and the patient, though believing himself perfectly well mentally and physically when admitted, still retained a clear recollection of his earlier mental symptoms. Many symptoms mentioned by other observers have not come under my ken. Hemianopsia, acute attacks of glaucoma (Charcot), colour blindness (Savage), alterations in the senses of taste and smell (Voisin), affections of hearing, loss of the finer relations of time in musicians, ptosis and external strabismus, local anaesthesia, attacks of vomiting, palpitation of the heart, with alternate flushing and pallor of the face, have all been described as premonitory symptoms of general paralysis. A heterogeneous collection of symptoms truly, and of very variable occurrence.

It is in but rare instances that we can trace the progress of a train of nervous symptoms, culminating in general paralysis, and for that reason I have thought it desirable to specially mention the following case.

The patient, a medical practitioner, had been addicted to the practice of self-abuse from boyhood, and after marriage indulged in sexual excess. At the age of 34 years he suffered from frequent attacks of migraine. These attacks were usually preceded for some days by marked dimness of vision, and were attributed to the eye-strain caused by this.

During the attacks photopsia was complained of, intense and persistent hemieranian headache began soon after, and persisted with more or less constancy for about four years. The pupils were observed to be very contracted. Attention was drawn to this from the fact of their usual condition being one of marked dilatation.

Three years later he suffered on several occasions from slight convulsive seizures with loss of consciousness. These attacks were usually followed by great physical and mental prostration. Transitory amnesia and lack of power of attention was often observed at this time, but seemed to be recovered from later. For the two years before his admission to the asylum he was very sleepless, restless and uneasy at night, suffered a great deal from neuralgia, that constantly changed its site, and involuntary startings and twitchings of groups of muscles. He also at this time displayed extreme sexual excitability. During the last two years there was gradually developed moral perversion, change in temper and conduct, alienation of affection for wife and other relations, and symptoms of a progressive dementia. When admitted to the asylum, at 40 years of age, he presented typical symptoms of general paralysis, which ran a rapid course leading to his death nine months afterwards.

On Five Cases of General Paralysis of the Insane.

HERBERT MACANDREW, M.B., C.M., Edin.

Medical Officer to the Asylum, Hokitika, New Zealand; lately Assistant Medical Officer to the Scaeliff Asylum, Dunedin; Junior Assistant Medical Officer at Salop and Montgomery Counties Asylum, England; and Clinical Assistant at Birmingham Borough Asylum, England.

In this paper Dr. MacAndrew gave the carefully recorded history of five cases of general paralysis of the insane, observed and treated by him in the asylum at Hokitika, New Zealand.

On Poisoning Caused by Canned Provisions.

WILLIAM M. HAMLET, F.I.C., F.C.S.,
Government Analyst, N.S.W.

"TINNED FOOD."—An order has been issued by the Admiralty prohibiting the issue to troopships of "tinned fresh herrings." The following are the circumstances which have given rise to the order:—A petty officer of the "Crocodile" died on the 8th January last, when in the Indian Ocean, of acute irritant poisoning (probably from ptomaines), caused by his having eaten some tinned fresh herrings 17 hours previously, while three other men who also partook of them were taken seriously ill but recovered. The tin had been open about 48 hours before the men ate the herrings. To guard against future accidents, tinned fresh herrings have been forbidden to be carried by the troopships, and all other fish preserved in tins, with the exception of such as are kept in oil, are to be consumed as soon as opened, or else destroyed.—*British Medical Journal*." Paragraphs of similar import to the foregoing appear from time to time in the newspapers, and as the subject is frequently brought before the notice both of the medical practitioner and the analyst, it may therefore be of interest to summarise a few facts observed whilst practically engaged in the investigation of an obscure, although now recognised, cause of death. Quite a large number of cases of poisoning by eating tinned food have taken place, and many friends in various parts of Australia have taken the trouble to bring under my notice details of similar cases; from the material thus obtained I condense the subject-matter and offer a short summary, fully cognisant of the fact that the whole question of poisonous proteids is at present very little known, and is practically an open field.

In dealing with the subject we have to keep in view two sides to this question:—First, the accidental entrance of foreign metals that may give rise to metallic irritant poisoning; second, the development of poisonous matter, whether ptomaines, toxines, or albumoses after the tins have been properly packed; and third, metallic compounds of the organic radicles generated in the tins as after-products, arising from the chemical solution of the tin and solder by poisonous proteids. Bearing this in view, we might expect to find the symptoms exhibited to be those of metallic irritant poisons of narcotic character, or sometimes tetanic like strychnine, both of which symptoms have been observed; but more commonly there is vomiting and diarrhoea with watery stools, dryness, and constriction of the throat, shivering, and headache. Now, what are the particular food stuffs that give rise to these effects? for the number and variety of foods that are now packed and offered for sale in hermetically sealed metal canisters must arrest the attention of anyone who enters a dry goods store. The varieties include fish, soup, vegetables, roast and boiled meats, fruit, milk, jams, and a host of delicacies, indeed, all the items of a well-stocked larder may be found under the gaudy-coloured exteriors of the preserved-food tin. The first case I remember happened sixteen years ago, and was that of a family in the eastern counties of England, who were taken ill after partaking of some canned pine-apple of an American brand. Chemical

analysis revealed the presence of tin compounds in the juice of the pine-apples. The persons attacked recovered after serious illness. Mr. Otto Hehner* examined a large number of tins of preserved asparagus, peas, tomatoes, peaches, cherries, milk, marmalade, and oysters. He found corrosion of the tin had taken place, so that the reaction for tin could be easily found in two grams of the material. .035 gram of metallic tin was found in 1 lb. of tomatoes; .045 gram of metallic tin in a tin of oysters. Hehner found that .075 gram of tin was fatal when administered to a guinea pig, while in another case it required 0.5 gram to produce a fatal effect. It was also found that the tin was poisonous when present in the stannous form but not as stannic compound; this fact is significant when one remembers the action of reducing agents on the oxyhæmoglobin of the blood, and explains probably the reason why stannous salts are poisons. In 1885 Professor Rennie had a case under his notice that happened at Tanunda, S.A. From his report he informed me:—"I rinsed out the tin with distilled water and found the washings distinctly acid, while the fish on the contrary was alkaline. I found $\frac{1}{4}$ -grain of oxide of tin to a tablespoonful of the fish and traces of lead. * * I am of opinion that the effects in this case were due to the presence of compounds of tin, which are known to act as virulent poisons." In December, 1885, a man named Mills died at Murrurundi after having eaten some tinned fresh herrings.

Unfortunately the tin was nearly empty when received. On rinsing out with distilled water I found traces of tin dissolved out.

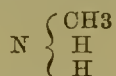
A tin of fresh herrings examined in 1886 was found to contain .068 gram of tin and traces of zinc. The contents were alkaline, and the tin was corroded. So much interest was manifested in this case at Murrurundi that Mr. James Maconochie, of Messrs. Maconochie Brothers, came to Sydney and interviewed me on the subject.

In June, 1886, one of Sir George Dibbs' daughters was taken seriously ill after eating some tinned jam. Recovery followed, and upon analysis of the jam left in the tin no metals could be traced, but the tin had been originally dirty, and decomposition had been set up in the carelessly packed preserve. The publicity given to this case led to the establishment of a jam manufactory in Tasmania where the most stringent precautions possible are observed, the proprietor using only the best tin plates for the canisters, and sterilising each can or pot of preserve. Last January, when visiting Hobart, I had the satisfaction of seeing the new process rigorously and perfectly carried out by Mr. Peacock. Through 1888, '89, and '90 many cases of canned food poisoning took place, but these were entirely due to tinned fish.

In 1890 there were four well authenticated cases of poisoning by canned cherries, which will be found recorded in the *British Medical Journal*, all 12, 1890, p. 833. Four men, *æt.* 18, 37, 25, and 42, respectively, partook of a freshly-opened tin of cherries on January 17, 1890, in London. In from $1\frac{1}{2}$ to 2 hours all were attacked with symptoms of irritant poisoning, vomiting, and diarrhœa being the dominant characteristic. The tin was about half full of cherries and juice and was acid, the acid being malic acid. Dissolved tin compounds were found equal to 64 grains of malate of tin. One man ate 22 cherries and juice; second man ate 20 cherries and juice; third man ate 10 cherries and juice.

The doses of stannous malate must have been from 4 to 10 grains. The toxic action was that of an irritant and cardiac poison with a slight irritant effect on the kidneys. The solder of the tin had been distinctly corroded. Now, in the cases considered, the poisoning is clearly caused by the tin or

tin and lead fermenting the food, and it is more likely that the organic acids of the fruit had dissolved tin and lead by their own inherent chemical action upon each other, rather than that particles or globules of metal should have been swallowed, since all the persons eating the contents of a particular tin have suffered from the ill effects. So far, then, all is clear; but how does it come about in the case of tinned fish which have invariably been found to be alkaline? Professor Rennie and myself have always found a certain degree of alkalinity in fish tins, whether opened recently or after some time. In 1889 I had a number of cans of fish from a parcel of six dozen tins, every one of which was found to be alkaline on being opened. The cause of this alkaline nature I traced to the presence of certain organic compounds, compound ammonias or amines, the first of the series being methylamine.



What I found, was a mixture of the primary, secondary, and tertiary monamines, all of which are powerfully alkaline and have the property of corroding tin plate. Here are bodies which form the earlier members of the series of organic compounds which include the toxins, poisonous proteids and ptomaines, which in the most complex members are highly poisonous.

The key to the difficulty regarding the explanation of fish poisoning is that the amine is formed first in the decomposition of the fish and afterwards tin is dissolved from the inner surfaces of the can, and thus may set up the irritant effects in the consumer. Further, if the tin be left exposed to the air for five hours at a temperature of from 70° to 80° Fah. poisonous proteids form, and ptomaines results which soon yields a solution giving characteristic ptomaine reactions. Thus the tinned fish consumer had to confront Scylla on the one side and Charybdis on the other; if he eats fish from the can just opened he may become ill from tin-lead poisoning; if he puts the open can aside until evening on a summer's day he falls a victim to ptomaine poisoning! What then, it may be asked, has the consumer to guide himself by? In all cases where the inside of the tin has been corroded* away leaving the iron bare and black, the food must be rejected as unfit for human consumption. The very slight darkening found on the inside of a box of sardines is due to the sulphur in the albumen having been liberated to form stannous sulphide. If the tin is bright and clean, the fish may be eaten at once; if allowed to stand for four hours poisonous proteids are developed, and the fish is no longer fit for human consumption. In all cases of sardine poisoning that have come within my experience there never had been any poisonous effect where the proper quantity of good olive oil was present in the tin. Rancid oil or adulterated olive oil had set up an action between the oleic acid and the metal, and brought about conditions favourable for poisoning. The reason why tinned ox-tongues and beef are generally free from danger is, the fact of there being sufficient neutral fat present to prevent any corrosive action, there usually being nothing seen beyond a slight darkening or discolouration caused by the sulphur from the albuminoids present.

The following, then, is the summary of what may happen with canned provisions:—

1. The solder may have found its way into the can, giving rise to lead or tin poisoning.
2. In cases where zinc chloride is used in the process of soldering up the tins, the liquid may have acidified the juices, so as to dissolve both tin and lead sufficient to set up irritant poisoning.

* Not mere darkening.

3. Cases in which the soldoring has been perfect, but where organic acids from the contents of the tin have acted upon the inside surface sufficient to dissolve or corrode away the tin and render the food poisonous.
4. Cases where the soldoring being perfect, the food has undergone saprogenic changes, and albumoses of a toxic character have resulted.
5. Cases where the series of bodies, known as amines, have been formed in the contents, corroding the inside of the tin, and thus causing tin-poisoning.
6. Cases where a toxic proteid body has been formed after opening, and after four or five hours' exposure to the air in hot weather.

The indications of safety to be observed in the case of canned provisions should be :—

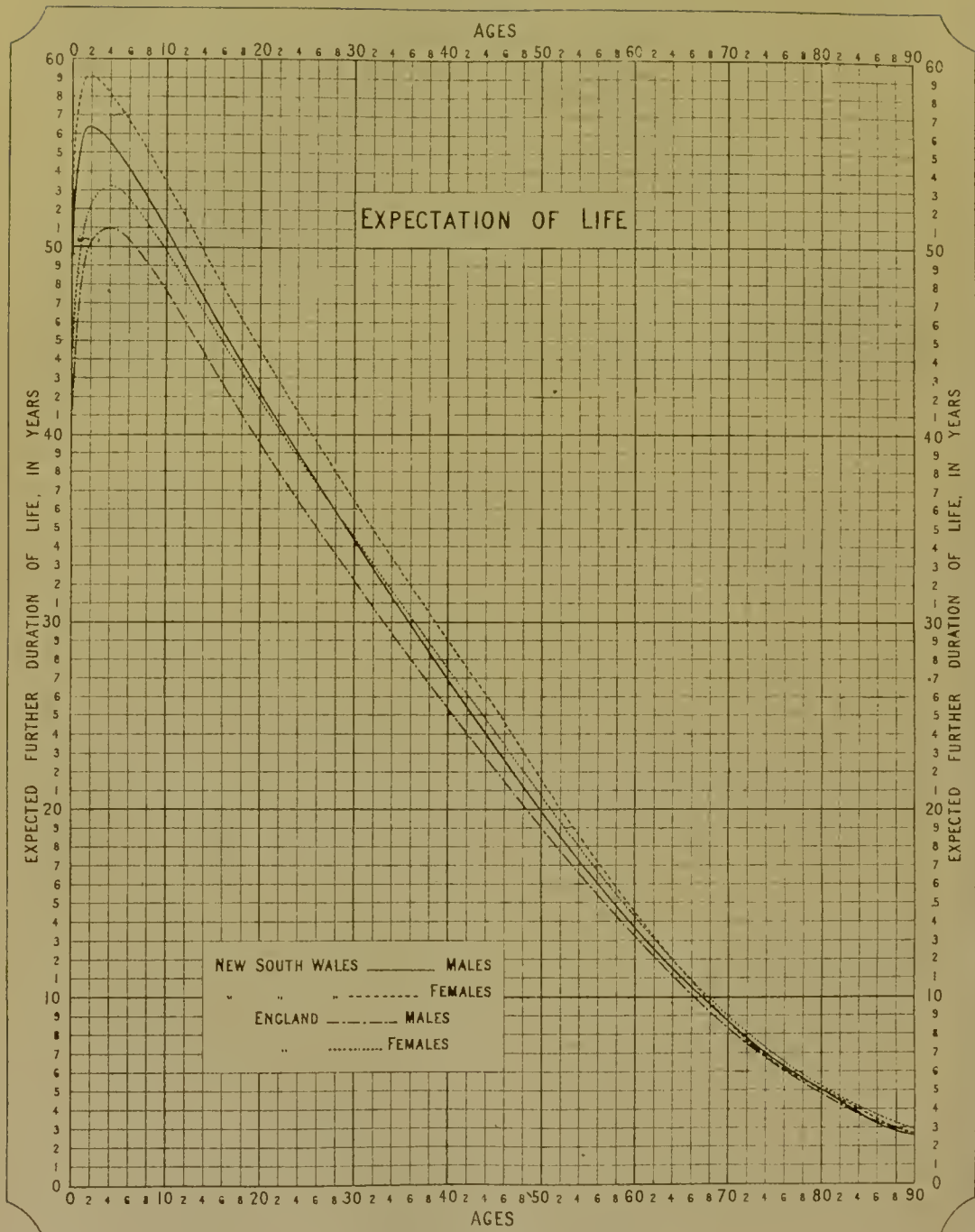
1. The clean and bright interior surface of the tin : there must be no corrosion.
2. Plenty of fat with meat and ox-tongues, and plenty of sweet olive oil with sardines ; a box of sardines, in which the oil has leaked out, should be rejected.
3. In warm, sultry weather, the food should be consumed immediately : all that remains to be destroyed.

POISONING FROM CANNED PROVISIONS.

The following is an extract from a report to the Foreign Office, dated the 23rd August last, by Captain W. F. Segrave, Her Majesty's Consul at Baltimore, on the subject of canned goods deleterious to health put up in the United States :—" Commercially all canned provisions that are hermetically sealed are packed in cans made of tin plate, *i.e.*, sheet iron superficially alloyed with tin. This article is imported exclusively from England and is subject to an import duty of 1 per cent. per lb. The average import for the past three years has been 3,600,000 boxes, which paid in duties 3,960,000 dollars. There is no tin-plate manufactured in the United States, and yet with nothing in the tin-plate trade to protect, the duty of a cent a pound is still imposed on it. One hundred and thirty millions of cans are every year manufactured in Baltimore city alone, and two million pounds of solder are consumed in making them. Equal parts of block tin and lead form the best solder, but no doubt a baser description of solder, composed of a larger proportion of lead is by no means uncommon. A flux of powdered resin, or a much more deleterious flux composed of chloride of zinc, containing free muriatic acid is applied to the tin surface to be soldered, and this the unfortunate and dangerous practice is, to apply on the *inside*.

" The use of an acid flux for inside soldering is objected to as a possible source of danger, whereas in cans where resin is used, it is asserted, and no doubt with good reason, that it communicates its taste to the contents of the can. To obviate both objections, the law which is compulsory as well in France as in Germany, should be passed and enforced in this country, to the effect that all cans containing articles of food should be soldered on the *outside*. Laudable efforts have no doubt been made by the trade to abolish entirely *inside* soldering, but not as yet with such entire success as they deserve. The first danger from the inside surface of solder is the direct solvent action on the lead of an acid fluid, when acid vegetables or fruit are

preserved without syrup. The second source of danger is from galvanic action. There is one special hermetically sealed product, which even in this country and in the trade has a peculiarly evil reputation, and that is the American sardine, in which there is great possibility of danger as at present put up. Notwithstanding the label is French, in the well known yellow and black letters, the contents are not sardines, nor are they put up in '*huile d'olive pure*,' but in cotton-seed oil. Professor Tonry, of this city, states in a report: 'I have now before me one of these sardine tins, with the solder on the inside, and fully one-quarter of the interior surface of the metal eaten away.' The fish that were contained in this tin were nearly all eaten by three persons, two of whom were children, and all were taken sick within half an hour after consuming them. The child who had eaten most freely died in twenty-four hours. I made a chemical examination of the viscera of the dead child and found lead; lead was also found in the oil, and remaining contents of the tin. A coroner's inquest was subsequently held, the verdict found being that death resulted from lead-poisoning from a sardine tin improperly soldered."



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PHOTO-LITHOGRAPHED AT THE GOVT. PRINTING OFFICE,
 SYDNEY, NEW SOUTH WALES.

To illustrate Mr. Coghlan's paper "A New South Wales Life Table."

A New South Wales Life-table

T. A. COGHLAN, A.M.I.C.E.

Government Statistician of New South Wales.

It is a matter of very common remark that nothing is more uncertain than the length of life which an individual may enjoy, and nothing more certain than the duration of lives taken in the aggregate. A life-table professes to give the number of persons out of a given number, usually 100,000, who may be expected to survive at the end of each year, commencing with birth, or year 0, until the last has been counted out. As a complement to this it shows the number who may be expected to die in the course of a year, and the mean after life-time of persons at each completed year of life. This last is what is usually called the expectation of life, and is so called in the life-table here presented.

The data required for a life-table are the number of persons living, as ascertained by an exact enumeration of the people, and the number of deaths recorded at each year of age. Experience, however, shows that neither in the case of one set of facts nor in the other, is absolute exactitude attainable, for without regarding those who deliberately misstate their age at the time of the census, there are always some, and by no means a few, who either do not know the year of their birth, or through error or misunderstanding, return themselves as at the decennial age nearest to their true age. Thus it is the universal experience, of those who have compiled a population census, that the number of persons returned at age 40, for example, largely exceeds that at 38, 39, 41, or 42, and similarly with 50 and other decennial ages. There is also a tendency, but not to so marked an extent, for persons near the quinquennial ages, if I may so term them, viz., 35, 45, 55, &c., to return themselves as at these and not at their real ages. The ages of persons dying are stated with more exactitude, although there is a tendency for the ages to group themselves round the decennial ages. It is, therefore, necessary in a life-table to make allowance for the bias or personal equation which the statements of ages exhibit, otherwise the expectation of life, when plotted to a scale, would exhibit a series of irregular points instead of the rather graceful curves which the diagram shows. Dr. Farr, to whose labours the world owes the first English life-table, adopted a system of adjustment which effectually smoothed off the angular points to which allusion has been made; but it is now recognised that this smoothing process was too effectual, and the variations from uniformity at certain ages arising from change of life, from the effects of climate and environment, or from emigration, are altogether lost. Since the compilation of the fourth, or last, English life-table by Dr. Ogle, the question of adjustment has been very fully discussed, and the method used by Mr. W. S. B. Woolhouse in adjusting the graduation of the tables of mortality, adopted by the Institute of Actuaries, has met with general approval, and it is the system of Woolhouse that has been

used in calculating the mortality on which the present tables are based. The detailed calculations will, probably, have little general interest, and are, therefore, not given; it will, perhaps, suffice to say that they have been elaborated with the greatest care, by the aid of competent assistants, and I have no hesitation in vouching for their absolute correctness.

The ages assumed were those ascertained at the census taken on the 5th of April, 1891, and the deaths those registered as occurring during the twelve months preceding and the twelve months following the day of the census. The number of persons dealt with was 1,123,954, being the population of the Colony, less the aborigines, and the number of deaths in the two years 30,834. It may be well to note at this stage that the death-rate of 1891 was very considerably augmented by the influenza epidemic, an abnormal proportion of deaths occurring amongst aged persons, especially females. This is a circumstance which should be taken into account in comparing life-tables hereafter compiled with the one now presented.

The necessity for exact data in calculating life-contingencies brought into existence the first life-table, but there are uses to which it may be put that are entirely apart from the requirements of the actuary. If the progress of medicine, viewed as the art of prolonging life, is to be measured, the only gauge which can be applied is the life-table, and in England it is held to be very positive evidence of the improved condition of the people that in the forty years which elapsed from the time Dr. Farr's first table of the expectation of life was compiled to that of Dr. Ogle, the tables showed an improvement of one and one-half year in the expectation at birth.

I am unable to compare the expectation of life now ascertained for New South Wales with that of past years, but a few comparisons with Dr. Ogle's table for England may not be without interest. First, however, I desire to allude to several material points which should be kept in view in dealing with the New South Wales table. The population of the Colony is composed of two-thirds native-born and one-third of British or foreign parentage, and of the persons over 30 years of age about one-half belong to the latter category. The average length of time which the non-Australian-born have spent in the Colony cannot, of course, be determined, but it must be abundantly plain that there is a very large number of persons in New South Wales whose past life has been very little influenced by Australian conditions. Thus the mortality experience which the tables and the diagram show is in reality of two kinds. The earlier ages are practically purely Australian, whilst the latter are partly Australian and partly British and foreign, the latter element getting stronger as the ages advance. Therefore, though the expectation here given is correct as regards the population as at present constituted, it might not be so if the Australian-born element as largely predominated at every age as it does at the earlier periods. I have not attempted to differentiate the two elements of our population with a view of discovering whether it is true, as is sometimes assumed, that the conditions in Australia are favourable for early and middle life but not for old age, or whether the very marked superiority of the Australian over the European death rate for the early ages is maintained throughout all the ages. The data by means of which such could be done are lacking. It may be here sufficient to say that there is evidence to show that the admixture of the non-Australian-born has not increased the expectations of life at ages where their presence is of importance, but it is also true that there is no evidence that the expectation at these ages is less than would have been the case were all the population native-born.

An inspection of the diagrams by which this paper is accompanied will show that the expectation of life, according to the New South Wales life-table, is greater for males for every year of age up to 84 than under the English life-table of Dr. Oglo. At birth (age 0 of the tables) the difference in the expectation is $8\frac{1}{4}$ years; at 5 years of age, 4.03; at 10 years it is 3.29 years; at 30, 2.2 years; and at 60 years, 0.46. For females much the same results are shown. Thus at age 0 the New South Wales expectation exceeds the English by 8.28 years; at 5 years by 4.34; at 10 years by 3.63; at 30 years the difference is 2 years; at 60 it is 0.27 years. At ages above 64 the expectation for females is higher according to the English table than in the New South Wales. It must not be supposed, however, this means that the superiority of the ages below 84 for males and 64 for females is lost after those years are attained. Such is not the case. It is true that there are more deaths compared with the population at the old age periods in New South Wales than in England, but it is also true that a larger proportion survive to these ages. Thus, out of 100,000 males born in New South Wales 42,899 will survive until 63, while in England the number is only 32,526. Similarly at age 70 the survivors in New South Wales would be 29,844, whereas in England they would number 22,206; at age 80 the survivors would be 11,132, against 7,735; at age 90, 1,156, against 802. The figures in regard to females show much the same proportions, for out of 100,000 females born in New South Wales 48,725 will survive till 64, against 37,049 in England; 37,570 will live till 70 years of age, against 27,723 in England; at age 80 the numbers are 13,657 and 10,894; and at age 90, 1,630 and 1,423.

On the diagram the expectation of life for males and females is shown for New South Wales and for England according to what is known as the New English Life Table of Dr. Farr. In each instance the expectation for females exceeds that for males, varying in the case of New South Wales from 3.3 years at age 0 to 2.5 years at 10 years, the curve approaching nearer and nearer as the ages increase, until ultimately the lines become almost merged in one another.

Neither the English life-table, as computed by Dr. Farr and Dr. Ogle, nor that computed by the author for New South Wales, show that the expectation of life of women of the reproductive ages, say 15 to 45 years, falls nearer to that of males at these than at other ages. Whatever may be the risks attendant on child-bearing, it seems they do not affect the death-rate of females more largely than accidents or other risks to which males are liable at the same ages.

NEW SOUTH WALES LIFE TABLE.

THE probabilities of living over and of dying in a year, and the average duration of life at each age, deduced from the results of the Census taken on the 5th April, 1891, and the mortality of the two years ended 31st March, 1892, are shown in the following table. The results are adjusted according to the system adopted by Mr. W. S. B. Woolhouse in the construction of the Tables of Mortality of Life Assurance Companies, collected and arranged by the Institute of Actuaries.

MALES.

Age.	Expectation of living a year.	Expectation of dying in a year.	Average duration of life.	Age.	Expectation of living a year.	Expectation of dying in a year.	Average duration of life.
0	·8722600	·1277400	49·60	46	·9861989	·0138011	22·58
1	·9719879	·0280121	55·78	47	·9858149	·0141851	21·89
2	·9873909	·0126091	56·37	48	·9853850	·0146150	21·20
3	·9920202	·0079798	56·09	49	·9848244	·0151756	20·51
4	·9935094	·0064906	55·54	50	·9838093	·0161907	19·82
5	·9940609	·0059391	54·90	51	·9821404	·0178596	19·13
6	·9954520	·0045480	54·22	52	·9804566	·0195434	18·47
7	·9965826	·0034174	53·41	53	·9789641	·0210359	17·83
8	·9974189	·0025811	52·65	54	·9771110	·0228890	17·20
9	·9979421	·0020579	51·78	55	·9758044	·0241956	16·58
10	·9981725	·0018275	50·89	56	·9752044	·0247956	15·99
11	·9980949	·0019051	49·98	57	·9740342	·0259658	15·39
12	·9979674	·0020326	49·08	58	·9724615	·0275385	14·79
13	·9977893	·0022107	48·18	59	·9709995	·0290005	14·19
14	·9975604	·0024396	47·28	60	·9686662	·0313338	13·60
15	·9972301	·0027699	46·40	61	·9650778	·0349222	13·02
16	·9970221	·0029779	45·52	62	·9617963	·0382037	12·47
17	·9965866	·0034134	44·66	63	·9581808	·0418192	11·95
18	·9961593	·0038407	43·81	64	·9544581	·0455419	11·45
19	·9957653	·0042347	42·98	65	·9511891	·0488109	10·97
20	·9954553	·0045447	42·16	66	·9491130	·0508870	10·51
21	·9951667	·0048333	41·35	67	·9469494	·0530506	10·04
22	·9949639	·0050361	40·54	68	·9446631	·0553369	9·58
23	·9947709	·0052291	39·75	69	·9419265	·0580735	9·11
24	·9945492	·0054508	38·95	70	·9377764	·0622236	8·64
25	·9942850	·0057150	38·16	71	·9317183	·0682817	8·22
26	·9940897	·0059103	37·38	72	·9244133	·0755867	7·75
27	·9937435	·0062565	36·60	73	·9169053	·0830947	7·34
28	·9934788	·0065212	35·83	74	·9089223	·0910777	6·96
29	·9932225	·0067775	35·06	75	·9014884	·0985116	6·51
30	·9930151	·0069849	34·30	76	·8948647	·1051353	6·27
31	·9928036	·0071964	33·54	77	·8889300	·1110700	5·95
32	·9926016	·0073984	32·77	78	·8824101	·1175899	5·63
33	·9922719	·0077281	32·02	79	·8757080	·1242920	5·32
34	·9919489	·0080511	31·26	80	·8690262	·1309738	5·00
35	·9915767	·0084233	30·51	81	·8607603	·1392392	4·68
36	·9910973	·0089027	29·76	82	·8501261	·1498739	4·36
37	·9906768	·0093232	29·03	83	·8362763	·1637237	4·04
38	·9903885	·0096115	28·30	84	·8197635	·1802365	3·73
39	·9900638	·0099362	27·57	85	·7995055	·2004945	3·44
40	·9896719	·0103281	26·84	86	·7750000	·2250000	3·18
41	·9892689	·0107311	26·11	87	·7485866	·2514134	2·96
42	·9887049	·0112951	25·39	88	·7281208	·2718792	2·79
43	·9879420	·0120580	24·68	89	·7053081	·2946919	2·64
44	·9872296	·0127704	23·97	90	·6842561	·3157439	2·54
45	·9866157	·0133843	23·27				

FEMALES.

Age.	Expectation of living a year.	Expectation of dying in a year.	Average duration of life.	Age.	Expectation of living a year.	Expectation of dying in a year.	Average duration of life.
0	·8888400	·1111600	52·90	46	·9895765	·0104235	24·60
1	·9721210	·0278790	58·45	47	·9892714	·0107286	23·86
2	·9894336	·0105664	59·11	48	·9892917	·0107083	23·11
3	·9927596	·0072404	58·74	49	·9887459	·0112541	22·36
4	·9954631	·0045369	58·16	50	·9882762	·0117238	21·61
5	·9948987	·0051013	57·42	51	·9875086	·0124914	20·86
6	·9950748	·0049252	56·71	52	·9870483	·0129517	20·11
7	·9965210	·0034790	55·99	53	·9859112	·0140888	19·37
8	·9976725	·0023275	55·19	54	·9847452	·0152548	18·64
9	·9985209	·0014791	54·11	55	·9834462	·0165538	17·92
10	·9989402	·0010598	53·39	56	·9820026	·0179974	17·21
11	·9987100	·0012900	52·45	57	·9801426	·0198574	16·52
12	·9984790	·0015210	51·52	58	·9790564	·0209436	15·85
13	·9982349	·0017651	50·60	59	·9773721	·0226279	15·17
14	·9979653	·0020347	49·68	60	·9755284	·0244716	14·51
15	·9976942	·0023058	48·78	61	·9736931	·0263069	13·86
16	·9973969	·0026031	47·90	62	·9713613	·0286387	13·23
17	·9970853	·0029147	47·02	63	·9680335	·0319665	12·60
18	·9967587	·0032413	46·16	64	·9656029	·0343971	12·00
19	·9965028	·0034972	45·30	65	·9625497	·0374503	11·41
20	·9963181	·0036819	44·46	66	·9594806	·0405194	10·83
21	·9961315	·0038685	43·62	67	·9564807	·0435193	10·27
22	·9958683	·0041317	42·79	68	·9532494	·0467506	9·72
23	·9956269	·0043731	41·97	69	·9483063	·0516937	9·17
24	·9952823	·0047177	41·15	70	·9427203	·0572797	8·64
25	·9949456	·0050544	40·34	71	·9355413	·0644587	8·13
26	·9945535	·0054465	39·54	72	·9275389	·0724611	7·66
27	·9943458	·0056542	38·76	73	·9171927	·0828073	7·24
28	·9941092	·0058908	37·98	74	·9076235	·0923765	6·83
29	·9939071	·0060929	37·20	75	·8984561	·1015439	6·47
30	·9937017	·0062983	36·42	76	·8893288	·1106712	6·15
31	·9934405	·0065595	35·65	77	·8803992	·1196008	5·85
32	·9930435	·0069565	34·88	78	·8748750	·1251250	5·57
33	·9925462	·0074538	34·12	79	·8673315	·1326685	5·30
34	·9921147	·0078853	33·38	80	·8600718	·1399282	5·04
35	·9917070	·0082930	32·64	81	·8536523	·1463477	4·78
36	·9913404	·0086596	31·91	82	·8446195	·1553805	4·51
37	·9911013	·0088987	31·18	83	·8343370	·1656630	4·24
38	·9910626	·0089374	30·46	84	·8262100	·1737900	3·99
39	·9908016	·0091984	29·73	85	·8117506	·1882494	3·72
40	·9905482	·0094518	29·00	86	·7953155	·2046845	3·47
41	·9903673	·0096327	28·27	87	·7795171	·2204829	3·24
42	·9901798	·0098202	27·54	88	·7590197	·2409803	3·00
43	·9897077	·0102923	26·81	89	·7309417	·2690583	2·80
44	·9897463	·0102537	26·08	90	·6650307	·3349693	2·64
45	·9896694	·0103306	25·34				

SECTION OF ANATOMY, &c.

President's Address

H. B. ALLEN, M.D., Melb.

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IN opening the proceedings of this section, I must in the first place express my appreciation of the great honor implied in the invitation to become your President. In view of the enormous scope of the section, I should have felt much trepidation concerning the responsibilities that devolve upon me, were it not for the presence of a distinguished band of vice-presidents and secretaries, worthily representing every department.

Anatomy, Physiology, Pathology, Therapeutics,—Being, Doing, Suffering, Healing.—All life is before us, all the knowledge of the body in health and in disease that underlies the work of the physician or surgeon. Nor can we separate these four great divisions of medical science from their foundations in chemistry, biology and physics, now happily made a compulsory part of the curriculum of all medical students throughout the United Kingdom. From the beginning of 1892, the first year of medical study must, according to the decision of the General Council of Medical Education and Registration, be devoted to these three subjects. The Universities of Australasia can congratulate themselves on having from the outset recognised the necessity for such preliminary training, and find themselves already in line with the new departure. The advocates of reform in the General Council pointed to the practice of our Universities to prove that such scientific education could, without hardship, be made compulsory.

Anatomy, Physiology, Pathology, Therapeutics,—Each is living, advancing, becoming more complex, and at the same time more simple. As we slowly grasp the essential principles, order is evolved amidst the chaos of accumulating details. Human anatomy is by many considered a branch of science almost perfected, in the further progress of which none but specialists have an interest. To show that this is far from being true, I need only point to the great changes that are being made in the principal text-books. "Quain's Anatomy," the successive editions of which embody the history of anatomy in modern times, is again being re-modelled under the learned and laborious care of Professors Schäfer and Thane. All honor and thanks to them for the parts of their work already published. In the department of Applied Anatomy, Edmund Owen's "Manual for Senior Students" fills a large lacuna. In what may be termed the philosophy of Anatomy, the appearance of Professor Alexander Macalister's text-book has produced a marked effect on the studies of candidates for the higher qualifications of the Examining

Boards. Extensive use is now made of our rapidly advancing knowledge of embryology, both human and comparative, and of the morphology of lower animals. Those methods of inquiry are by no means new, but they have undergone almost a *renaissance* by the greater range and intensity of their employment. Long ago the veterans of research watched with wonder the development of the circulation, and their labours explained the anomalies so commonly seen in the heart and in the great vessels. The same methods are now zealously applied in every part of the body. Light has thus been brought into many a dark place. For example, in the hand and foot we can trace the evolution of the special muscles, from their first simple symmetrical arrangement around the bones of each finger or toe, step by step up to their disposition in the adult man, where symmetry has been subordinated to specialisation of function. In this developmental process lies the explanation of most of the irregularities that from time to time present themselves. The study of the condition of the limbs of the fetus during the various periods of gestation has done much to simplify our ideas concerning congenital club-foot.

To take another example, the central part of the thyroid gland is known to be the retrograding remnant of an organ provided with a duct which opened at the foramen cæcum on the dorsum of the tongue, while the lateral parts of the gland were developed in connection with the fourth branchial pouch. Both the central and the lateral portions were at first tubular buds from the pharynx, ending in racemose alveoli. In man the duct usually withers away, but not always. From time to time a persistent thyro-glossal duct is found, and even in its absence traces of its former existence may appear in the form of supernumerary glands in various places between the thyroid body and the tongue. Originally the gland was distinctly a secreting organ, the products of its activity escaping into the pharynx; and though in man the central portion shrinks into the isthmus and the occasional pyramidal lobe, and though the general tissue of the gland is changed into a series of capsules containing an altered colloid substance, the connection of the organ with mucin formation remains manifest. For it is well known that in man, in monkeys, and generally in carnivora, removal of the thyroid is often followed by a kind of myxœdema throughout the body. According to Horsley, the myxœdema is one stage in a train of phenomena arising from a profound disturbance of the nutrition of the body, the first stage being manifested by neurotic troubles, the second by myxœdema, and the third by cretinism and emaciation. In order to prevent these evils, several surgeons when removing goitrous tumours have grafted a piece of thyroid tissue into the peritoneal or sub-peritoneal tissue or elsewhere. Good results have been attained in some cases, but it is difficult to secure the permanence of the engrafted tissue. Even the myxœdema of cretins has been favourably influenced by similar measures. The exact explanation of the control which the thyroid exercises over the nutrition of the body is doubtful. Gentle pressure causes the colloid substance to pass from the thyroid into the lymphatics; and microscopic sections show the existence of colloid in spaces and clefts between the vesicles, probably lymph spaces. Hence, in the opinion of Horsley and others, the thyroid continues during life to secrete some substance which is absorbed, and plays a useful function in the general metabolism of the body.

In the spinal cord we have learned not only to differentiate the anatomical elements, but also to assign them their respective functions with a precision far beyond the possibilities of former times. The grey matter of the cord is no longer spoken of in general terms. The visceral and vasomotor centres

of the lateral and posterior horns and the inhibitory centre of Clarke's column have been more or less fully identified, as well as the great motor column of the anterior cornu. Much has been done in the direction of defining the motor and sensory areas in the white substance, for example, to distinguish not only the paths of voluntary and vasomotor impulses, but also the tracks for sensations of touch, temperature, and pain, for those related to the superficial and deep reflexes, and for those conveyed by the sacral, lumbar, dorsal, and brachial nerves. How greatly the study of the structure of the brain has been simplified by the assistance of embryology! Many of the old difficulties have disappeared, such as the relation of the lateral ventricles to the third ventricle and the development of their cornua; the connection of the corpus striatum with the central convolutions; the history of the olfactory nerve, and its course through the uncinate convolution and the fornix into the subthalamic region; the relation of the pineal gland to the central pineal eye, which my colleague, Professor Spencer, demonstrated so excellently in the *lacertilia*; the probable origin of the peduncles of the gland from an old optic centre in the front of the thalamus; the possible development of the pituitary body in connection with an obsolete sense organ, and of the locus niger of the crus cerebri, that curious detached mass of nerve cells, with an archaic mouth. There is no need to remind you in any detail of the many sources from which our new knowledge has come. Minute anatomy, embryology, and experimental physiology have each and all made vast contributions; and, as in many other departments, the crowning work is derived from the clinical and pathological sides. Gradually we are attaining the power to localise lesions of the nervous centres with comparative accuracy, and to explain the complicated symptoms produced by them. The surgery of the brain has given rise to a large literature. Already it has been possible to collect in a useful volume the practical results obtained in the surgery of the spinal cord. But, now and ever, as Dr. John Williams insisted during the First Session of this Congress, we need a thorough co-operation between the clinical and the pathological workers. Pathological observations of the greatest interest are robbed of most of their value when an adequate clinical history is not available; and the most complete and accurate clinical histories are of comparatively little worth, unless the pathological record is equally full and reliable. But the field of labour is vast, while the workers are few. I rejoice to see signs that a better time is coming, that numbers of distinguished young graduates will come to the rescue, and make possible the minute examinations, the precise records, that are so greatly needed.

In the special domain of pathology how phenomenal has been the advance of knowledge since Sir James Paget's masterly lectures, commencing in 1847, taught English surgeons the essential doctrines of inflammation and repair. Here, also, the new development has been largely dependent on the aid afforded by general biology. Two instances at once suggest themselves. The well known lectures of Bland Sutton were based on the systematic examination of the bodies of 12,000 animals, pertaining to the most varied branches of the vertebrate sub-kingdom. Most of this material was afforded by animals dying in the gardens of the Zoological Society; but this special field of research, which Sutton so well appreciated, did not keep him away from other theatres of pathological work. Years of patient observation in the *post-mortem* room and museum of Middlesex Hospital, and careful dissection of over 800 fœtuses, aided to give him a sound and comprehensive grip of comparative pathology, and enabled him to produce his delightful and stimulating volume.

Together with these studies of morbid processes in vertebrates, we may select for special mention the brilliant lectures of Metchnikoff on the comparative anatomy of inflammation, delivered at the *Institut Pasteur* in April and May, 1891. He lamented that pathologists had neglected too much the comparative method, though engaged with problems of the most complex character, in which no final results could well be expected unless the various phenomena were disentangled and studied separately. Hence he watched the process of inflammation in the amphioxus and in the tadpole's tail, so that the disturbances of the circulation should be of the simplest kind known among vertebrates; he set himself to learn if inflammation could be produced in animals destitute of vessels, and, if so, what was the behaviour of the nervous system. He carried his researches into the domain of animals composed of masses of undifferentiated cells, and even into that of the unicellular organisms. He inquired whether the vegetable kingdom could show any phenomena comparable with those of inflammation. In this way he was enabled to describe and figure the effects of injury and of invasion by micro-organisms in various living forms, such as amœbæ, infusoria and sponges, and so on through the series of invertebrates till he reached the simpler forms of the vertebrate sub-kingdom. He brought under review the digestive action of monads, the chemotaxis or chemical attractions and repulsions of the plasmodia of myxomycetes, the phagocytic phenomena of sponges and of various higher forms of life. According to Metchnikoff, the primitive essence of inflammation is a digestive action of protoplasm directed against noxious agents. This defensive power belongs to the whole or almost the whole organism of protozoa, and to the whole plasmodic mass of myxomycetes, but from the sponges upwards it concentrates itself in the mesoderm. The phagocytic cells of this layer approach, envelope, and destroy the noxious agents. The reaction is slow in the simpler forms of life, since the defending cells can approach the noxious agent only by their own amœboid movements; but it becomes much more rapid with the appearance of blood-vessels and blood corpuscles. By the aid of the blood-stream the organism can at any moment hurry a great number of phagocytes to the endangered spot. From these laborious researches, Metchnikoff concludes that "the essential and primordial factor of a typical inflammation consists in a reaction of the phagocytes against the injurious agent." In the course of his lectures, he lays stress upon the general leucocytosis, or accumulation of pale corpuscles in the blood, that is seen in erysipelas, croupous pneumonia, anthrax, and other bacterial diseases. In pneumonia, the leucocytosis accurately follows the march of the fever, and ends suddenly or gradually with the crisis or lysis of the disease. The same phenomenon may be induced by injecting into the blood the soluble products of micro-organisms, such as the bacillus pyocyaneus; but it is not seen in all bacterial fevers, being absent in typhoid. The ordinary phenomena of inflammation have, according to Metchnikoff, one definite purpose, to cause a great afflux of phagocytes towards the injured part. He connects the local dilatation of the vessels with the vasomotor system, and points out that Cohnheim, in endeavouring to exclude the action of the nerves, neglected those that accompany the vessels. The salutary influence of the nervous system over the process of inflammation is illustrated by Samuel's experiment. In a rabbit, congestion of one ear is caused by section of the trunk of the sympathetic, while inhibition of the sympathetic in the other ear is prevented by section of the sensory nerves. Both ears are now treated with water at 54 degrees C. The first ear undergoes inflammation, with speedy cure, while the second shows no hyperæmia, but passes through stasis into gangrene. Having thus dealt

with the increase of leucocytes in the blood, and with the dilatation of the vessels in the injured part, Metchuikoff explains the doctrine of chemotaxis, the attraction of phagocytes to the point of danger, or their repulsion from it. Leber showed that a crystallisable substance extracted from cultures of the *staphylococcus aureus* exercises an attractive influence over leucocytes, so that if a tube containing this material is inserted into the anterior chamber of the eye, the pale corpuscles crowd into the tube against the action of gravity. Various observers have shown that this influence is manifested by most microbes, that living organisms produce a greater effect than dead ones, and that leucin also possesses this attractive power. On the other hand a few very virulent microbes, such as those of chicken cholera, and also various reagents, such as lactic acid, alcohol, or quinine, repel the advance of leucocytes. Other substances, again, are indifferent. Thus we are introduced to positive and negative chemotaxis, the attractive or repulsive influence which microbes and their products exercise over leucocytes. Migration is, for Metchnikoff, essentially an active process. The pale corpuscles fall out of the central current in the veins mainly for mechanical reasons, but their passage through the walls of the vessels is due to their own amœboid movements, though facilitated by changes in the vascular lining. Such migration will not occur without a positive chemotaxis, a sensibility of the leucocytes to some attraction in the tissues. This sensibility plays an altogether preponderant part in inflammatory disorders. If it is in a positive state, the leucocytes emigrate in spite of feeble dilatation of the vessels; but if it is negative, no migration will occur, although the vessels are dilated. If some tubercular bacilli are inserted under the skin of a guinea-pig's ear, there is only slight dilatation of the vessels with abundant diapedesis; while if a few septicæmic vibrios are introduced instead, there is considerable dilatation, but almost no diapedesis. When the same microbe is used, similar differences are found to exist between protected and unprotected animals. Thus, if some vibrios are inoculated under the skin of the ear of vaccinated and unvaccinated guinea-pigs, the resulting inflammation is much greater in the unprotected animals; the vascular dilatation, the local heat, and the serous exudation are comparatively excessive, but the migration of leucocytes is much less abundant. In other words, the protective vaccination encourages the phagocytic reaction, while limiting the other phenomena of inflammation. If the sensibility of leucocytes is annulled by chloroform or paraldehyde, without paralysing their amœboid movements, diapedesis is effectually prevented. When the leucocytes have travelled into the tissues, they approach, surround, digest, and destroy the invading microbes. But the various kinds of leucocytes vary greatly in their powers. The little lymphocytes, and those which stain so deeply with eosin, have no phagocytic power; the larger mononuclear leucocytes devour the bacilli of leprosy, but do not assail the streptococci of erysipelas, nor the gonococci, both of which are attacked by the more numerous polynuclear emigrants. Soluble ferments have been found in leucocytes, with power to convert starch, fibrin and gelatine, the digestion being of a neutral or alkaline type. The activity of these ferments is destroyed by heat. Thus Metchuikoff includes in his doctrine of phagocytism the multiplication of leucocytes in the blood, the afflux of blood containing leucocytes to the invaded tissue, the sensibility of the leucocytes in the vessels to substances diffusing from the area of bacterial infection, their active migration into the tissues, and their direct action upon the microbes. Stress is also laid on an active state of the endothelium of the vessels, favouring exudation and emigration, the endothelial cells also displaying marked phagocytic power. The mobile

cells of connective tissue, for instance, in the tadpole's tail, also act as phagocytes, but their number is so limited that their action is relatively unimportant. Metchnikoff formerly taught that the fixed corpuscles of connective tissue were also endowed with phagocytic power, but further researches have led him to a contrary conclusion. Finally, he concludes that, in the progressive series of living forms, there is a gradual evolution of the phagocytic reaction. Among the daphniæ it fails altogether in many diseases. It is more powerful in amphibia, and still more in rabbits. Yet, in the small animals of the laboratory, we meet with many overwhelming diseases in which the reaction of the leucocytes is absent, being prevented by the poisonous products of the microbes. In man, and in the higher animals generally, such diseases are infinitely less frequent.

Metchnikoff's views have been confirmed in every essential point by Ruffer's researches concerning quarter-evil. The leucocytes gathered to the spot where the microbes had been introduced, being attracted by the chemical poisons secreted by the bacilli. They directly attacked the invading microbes, taking them into their own substance and destroying them. The cellular migration at the point of inoculation varied inversely with the strength and quantity of the virus introduced, but was directly proportionate to the duration and curability of the disease. If by any cause, either mechanical or chemical, the leucocytes were prevented from reaching the virus, the disease invariably progressed and the animal died. For instance, the introduction of lactic acid prevented diaporesis, and gave a free course to the invaders. The case was altogether different as regards fluid exudation. It would rather appear as if diaporesis and exudation stood in some inverse relation to each other. In malignant cases, with rapid death, there was abundant thin sero-sanguineous exudation, but this had no power to arrest the disease; on the contrary, the bacilli grew rapidly in it, and acquired a greatly increased virulence. In spite of the abundant outpouring of serum, there is not a sign that the microbes are injuriously affected by it. In animals which resist the invasion, a tenacious solid material accumulates around the implanted virus, thus presenting a marked contrast with the phenomena of malignantly progressive cases. Other interesting arguments, based largely on pneumonia, were adduced by Adams in the recent discussion on phagocytosis before the Pathological Society of London.

The doctrine of phagocytosis has not met with general acceptance. Klein has gone so far as to declare that, as regards the destruction of bacteria, the leucocytes might as well be absent. Burdon Sanderson, in his comprehensive Croonian lectures, maintains that all pathogenous microbes show signs of structural degeneration if they remain a sufficient time in relation with living protoplasm. The degeneration occurs in blood, in lymph, and in tissue. When leucocytes are present, the microbes which remain free show the same changes as those which are incorporated by the leucocytes, and in the same degree. In general, vigorous microbes are not incorporated, so that incorporation is a sign of impaired vitality and diminished resistance. Non-corpuscular liquids, such as aqueous humour, pericardial fluid, serum of blood, or lymph from beneath the skin of a frog, all possess a toxic power over bacteria. In erysipelas, it is difficult to imagine that the invading myriads of streptococci can be effectually opposed by the leucocytes which follow in their train. Leucocytes do not appear at the place or time that they are wanted. In cases where Metchnikoff saw only an arrest of diaporesis, Sanderson sees an inhibition of the whole process of inflammation. Frequently after inoculation, suppuration occurs in animals naturally or artificially immune, while infection occurs in others. The destructive action

of the body against microbes resides both in the blood and in the tissues, in organised protoplasm and in intercellular fluid. The contest which takes place in the organism is not a hand-to-hand fight between the microbes and the living elements of the invaded territory, but one in which both act at a distance. The weapons on both sides are poisons and counter poisons, toxines and anti-toxines. Thus the question of infection becomes more and more chemical, *less* morphological. "We care for microphytes not as botanical species, but as makers of toxines, and for toxines not as chemical compounds, but as producers of disease."

Though the difference of opinion is so great, Sanderson admits with reservation the facts submitted by Metchnikoff. Microbes, though alive and virulent, are in laboratory experiments incorporated and destroyed by leucocytes. Metchnikoff is thoroughly aware that in other experiments microbes have been destroyed by the action of non-corpuscular fluids. Each recognises a limited foundation of truth in the other's position, but each maintains that the foundation on which the other builds is so limited as not to affect the main question.

Metchnikoff devotes a special chapter to serous inflammations, which he classifies and studies in detail, in order to test whether, in actual life, the serum of blood can destroy bacteria. The serum of rats kills the bacilli of anthrax, and that of guinea-pigs is toxic to the septicæmic vibrio, but the power so manifest *in vitro* is not exercised in the living animal. Almost without exception it is found that though the serum of an animal kills certain bacilli, these very bacilli can grow and flourish in the living body of that animal. The serum of rabbits vaccinated against tetanus destroys large quantities of the tetanic toxine, but in tetanus serous inflammation is conspicuously absent. After studying a number of diseases, Metchnikoff concludes that serous inflammation is not a salutary reaction with the object of converting toxine into anti-toxine. Possibly the serous exudation serves to dilute the toxines and render them less active. From the standpoint of comparative pathology, serous inflammation is of much more recent date than the reaction of leucocytes. There is no trace of it among invertebrates, whether provided with a circulation or not. It is rarely seen, even in the least degree, among amphibia. From every point of view, serous inflammation is much less important than that which is accompanied by accumulation of phagocytes in the focus of inflammation.

The action of rat serum upon the bacillus of anthrax has recently been studied further by Metchnikoff and Roux. If a capillary tube, open at one end and containing rat serum, is placed under the skin of a mouse, leucocytes rapidly swarm into the tube. The serum attracts the leucocytes, or, in other words, exercises a positive chemotaxis. If the serum of a rat and a culture of anthrax bacilli are introduced together, the serum acts directly upon bacilli, just as in laboratory experiments, and it also attracts the leucocytes. The bacilli then perish, being ingested and destroyed by the leucocytes. But the protective action of the serum is purely local. If the serum and the bacilli are introduced in different places, the bacilli flourish and the animal dies of anthrax.

It is not surprising that such a contest of opinions should arise. The study of micro-organisms is beset with difficulties. In the domain of morphology how easily mistakes may occur. Thus in several histological preparations made by my demonstrator, Mr. Cherry, a ray fungus was present, closely resembling actinomyces; careful examination showed that it was on, and not in, the sections. On further inquiry, a similar organism was found in the

sediment of a pressure filter in the laboratory, connected with the Melbourne water supply. So also when Dr. Katz was examining the same water supply under the direction of the Royal Sanitary Commission in 1889, he found several microphytes resembling the bacillus of typhoid. One of these was mobile, grew on potato precisely like typhoid, and resembled typhoid closely in its cultures on gelatin, excepting that after the fifth day the colonies invariably caused slow liquefaction.

The morphological difficulties, however, are trifling in comparison with those which attend the chemistry of bacteria. Ptomaines and other alkaloids are relatively manageable; but what chemist will undertake to speak confidently concerning albumoses, paratoloids, and enzymes? Unstable as these compounds are, sometimes defying analysis, information is rapidly accumulating concerning their actions, and before long many of them will certainly be in frequent use in the combat with infectious diseases. The microbes and their enzymes must be distinguished from the alkaloids and albumoses, which they form by digesting proteid substances. Alkaloids, include ptomaines and leucomaines, but the latter are physiological products, such as xanthin and kreatinin, not formed by the action of microbes, so that they need not detain us at present. Ptomaines are the alkaloids formed by putrefactive organisms. As a rule they are colourless oily liquids, but many have been separated in crystalline form. They are strongly alkaline, neutralising the most powerful acids. Some contain carbon, hydrogen, and nitrogen, but others contain oxygen also. An example of those not containing oxygen is afforded by mydalcine, the intensely poisonous alkaloid formed in dead bodies after the second or third week; and of those containing oxygen by muscarine, the powerful poison of toadstools, which is obtained also from putrefying fish. Similar alkaloids are formed by many pathogenic microbes, such as the bacilli of anthrax and of typhoid fever, and others have been isolated in cases of scarlatina and other diseases, concerning the causation of which no exact information has been obtained.

Albumoses are quite distinct from alkaloids, being proteid substances chemically indistinguishable from the intermediate products formed during the digestion of albumen. They have been obtained from cultures of the bacilli of anthrax, typhoid, diphtheria, cholera, tetanus, &c., and from cultures of the staphylococcus aureus. Those of anthrax may be taken as typical examples. As Sidney Martin points out, when the bacillus anthracis is grown in a proteid medium, it digests the proteid in the same fashion as pepsin, producing hetero-albumose, proto-albumose, deuto-albumose, and peptone. Its further action resembles that of pancreatic ferment, in splitting up the proteid matter so as to form leucin and tyrosin, but it differs from trypsin in that its final product is an alkaloid. In the living body the alkaloid is produced more abundantly than the albumoses, and is the chief agent in causing death. The coma and the local œdema are both due to the alkaloid, while the febrile phenomena are referable to the albumoses.

Of the albumoses, hetero-albumose is nearest to albumen; it resembles globulin, being coagulated by heat, insoluble in water, but soluble in weak saline solutions. Proto-albumose is soluble in water, either cold or boiling, but is precipitated by saturation of the solution with sodic chloride or by nitric acid. Deuto-albumose is more closely related to peptone, not being precipitated by saturation with sodic chloride nor by nitric acid. All these albumoses differ from peptone in not dialysing freely, and in being precipitated by saturation with neutral ammonium sulphate.

The tuberculin of Koch is neither an alkaloid nor an albumose. It is neutral, resists high temperatures, and dialyses readily. It differs from peptones in several particulars, specially in being precipitated by ferric acetate. Koch calls the active principle paratoloid.

Concerning the soluble ferments or enzymes formed by microbes, much information has accumulated; but the sum of our knowledge is as nothing compared with the immensity of our ignorance. Some enzymes have powers as ferments resembling those of the microbes that produce them. Some excite in the bodies of animals toxic symptoms exactly resembling those caused by the living microbes from which they were derived. But in many cases the enzymes are so closely connected with alkaloids or albumoses, that it is difficult or impossible to speak of them separately. An interesting example of the relation of the ferment to the albumoses is afforded by diphtheria. Sidney Martin states that when the bacilli are grown in broth, to which alkali-albumen has been added instead of peptone, the alkali-albumen is converted into proto- and deuterio-albumose with traces of an organic acid. These albumoses, when inoculated, cause fever, loss of weight and paralysis, with degeneration of the peripheral nerves, the muscles and the heart, while the nervous centres remain unaffected. The organic acid produces like results, but in less degree. The same albumoses and acid are found in considerable quantity in the internal organs, notably in the spleen, of diphtheritic subjects. The membrane in the throat is in process of digestion, hetero-albumose being first produced, and subsequently proto- and deuterio-albumose, with traces of the organic acid. An extract containing all the proteids of the membrane, when injected into rabbits, causes all the phenomena above mentioned; but a single small dose produces results which only multiple doses of the albumoses can effect. Moreover, the albumoses may be present in the membrane in only trivial amount when they are comparatively abundant in the spleen. For these and other reasons it is argued that the toxic effect is largely due to a ferment. According to Martin, the bacillus growing in the membrane liberates a ferment which, when absorbed, digests the proteids of the body, forming albumoses and an organic acid; these products of digestion are the lethal agents, and cause the fever, depression and paralysis.

The defensive proteids of the body must be distinguished carefully from the poisonous albumoses—the anti-toxines from the toxins. When an animal is gradually accustomed to injection of a toxine, it in many instances becomes resistant to otherwise fatal doses. A defensive proteid is formed in the body, not however from the toxine, but as a result of the metabolism of the body itself. Such proteids have been isolated, and found to consist of albuminous bodies, which, like ferments, are soluble in a 50 per cent. solution of glycerine, and are destroyed by moderate heat. Hankin proposes to classify the defensive proteids according as they exist naturally in the body, or are found only in animals artificially made resistant against some disease. He would call the former “sozins,” and the latter “phylaxins.” Sozins are found in all animals, and act on numerous microbes or on their products. Phylaxins appear to act only on one microbe or its products. Sozins and phylaxins are further divided according as they act on the microbe or on the toxine formed by it. Mycosozins and mycophylaxins act upon microbes, toxosozins, and toxophylaxins upon the toxins formed by them. Hankin first obtained a defensive proteid (known as cell globulin B) from the spleen and lymphatic glands—from cells that were potential phagocytes. He holds that possibly these proteids are the weapons used by the phagocytes in their conflict with microbes, and that they escape into the serum only on the death of the cells. Ruffer, in the researches already

referred to; shows that the dead serum of guinea-pigs, which have no immunity, manifests strong toxic action upon the bacilli of quarter-civil, while the living fluids of the same animal have no such power. Hankin's suggestion agrees with the theory of Metchnikoff, and accounts for most, if not for all, of the phenomena on which Buchner and the humoralists lay stress.

In an exhaustive lecture on Immunity, Roux indicates the limited scope of the doctrine of defensive proteids. He points out that they are found in the spleen of a rabbit susceptible to anthrax as well as in that of the more resistant rat; and he thinks it probable that these agents have not their full power till they have been artificially isolated from the organs in which they occur. Guinea-pigs vaccinated against the septicæmic vibrio, or the microbes of blue pus or of hog cholera, are still as susceptible as ever to the corresponding toxins. The microbes and the toxins of tetanus have no effect whatever upon fowls, and yet the blood of fowls cannot destroy the toxins; it acquires this power only when the toxin has been injected into the fowl, and the power varies with the quantity introduced. Timm forbids me to follow the whole argument of Roux. He concludes, with Metchnikoff, that acquired immunity consists in the phagocytes becoming accustomed to the products of the microbes, so that the phagocytes attack the invaders more vigorously, and are not repelled by their toxins. Natural immunity, of which less is known, is explained, in many cases at least, by the normal resistance of leucocytes against bacterial poisons. There may be other means for the protection of the organism, but the action of phagocytes is the most common and the most effective. During the present year Metchnikoff has published his researches concerning hog cholera, and these furnish striking confirmation of his main doctrine.

Apart from these abstruse questions, the unknown penetrates deeply into all departments of pathology. In inflammation great differences of opinion still exist concerning the parts played by leucocytes and by the fixed corpuscles of connective tissue. Ziegler has recently retracted his teaching concerning the constructive power of leucocytes. He now states, and his view is generally accepted, that they take no share in the formation of new tissue. In catarrhal pneumonia many authorities hold that the cells which fill the air vesicles are swollen emigrants, not derived from proliferation of epithelium. In tubercle, Sanderson considers it proved that the bacillus has no phlogogenic power, and that it causes tissue proliferation only, while Metchnikoff shows the bacillus provoking abundant diaporesis. Boyce, who agrees with Ziegler's recent teaching, says that "in chronic inflammation, with its marked tissue proliferation and accompanying increased vascularity, one sees the older (Virchow's) view of inflammation. Whilst in well-marked acute inflammation, with its prominent vascular phenomena—notably the leucocytic—and with the less prominent tissue changes, we become acquainted with Cohnheim's view. These extremes merge into one another, on the one hand by the proliferative tissue changes decreasing, and on the other by the vascular phenomena increasing, and *vice versa*." It would greatly simplify the task of the teacher if he could point to leucocytes as concerned only in the acute stage of inflammation, and to tissue corpuscles as the sole agents of repair and of productive inflammation. But there is ample room for doubt whether such an absolute differentiation of function is possible.

Concerning dropsy, even in its apparently simple mechanical forms there are factors that elude us. Why in one case does a limited obstruction cause copious effusion, while in another a thrombosis of all the crural veins is

unattended with œdema? Of dropsy as a result of heart disease, our knowledge is generally reliable, but it is sometimes at fault. In certain cases of marked valvular incompetence dropsy is absent, while others in which the leakage is relatively slight are attended with abundant œdema. In renal dropsy we distinguish primary acute dropsy of general character with high blood tension from late insidious dropsy affecting the dependent parts and associated with low blood tension. But our knowledge is approximate, not precise. Dickinson has done useful work by insisting on the dynamical factor in the dropsy of both acute and chronic kidney disease; and probably we are on safe ground in referring the late dropsy seen in cases of contracting granular kidney to the progressive dilatation of the heart; but I am convinced that primary renal dropsy will not be fully understood till the phenomena of the peripheral circulation have been studied much more profoundly, so that we may know how dynamical conditions interact with the chemical constitution of the blood and with the structural and vital changes in the minute vessels.

The origin of tumours is still obscure. Cohnheim's doctrine of persistent embryonic rudiments probably applies to few cases. Sir George Hnmphry has endeavoured to simplify our ideas by dwelling on the analogy between congenital overgrowths and tumours. The cause of malignancy in tumours is yet to be found. Much has been written about the presence of sporozoa and kindred organisms, but nothing has yet been established. Great interest will attach to the publication of the complete researches of Ruffer and Walker. The classification of malignant tumours according to their origin from the layers of the embryo will possibly not be of long duration. Some test will be found at once more definite and more intimately concerned with the causation of the growth. The relation between these layers, between epithelial cells and the elements of connective tissue, is closer than we are apt to believe. Histology shows us that deep processes of epithelial cells unite with the outrunners of connective tissue corpuscles. In the downgrowths that form in rodent ulcers, these connections sometimes become very manifest, especially when the progress of the growth has caused some traction upon them; the acinous downgrowths may be burst open, but the process is very different from that produced in epithelioma by the active growth of the cells. The origin of the nests in epithelioma requires further study. In many instances the usual description holds good; the marginal cells of the invading columns are flattened in imbricated fashion around the central cells; but even in this case two distinct types are found. In one the central cells are hard, horny, wrinkled; in the other they are large, plump, and rapidly proliferating. Thus these central cells may play a passive or an active part in the formation of nests. In some chronic cases nests originate in an altogether different manner. The invading columns may be seen slowly advancing along the lymph spaces. The lymph current is more or less stagnant. The endothelial cells on the walls of the spaces (or possibly the plasma cells) become swollen, sometimes forming huge plaques. The epithelial cells gradually surround these swollen elements, and become flattened around them in nest fashion. Vacuolation and inclusion of cells within cells are frequent, and the appearances so produced are strikingly similar to the drawings of so-called sporozoa recently published. These phenomena of epithelial downgrowth are beautifully shown in preparations made by my demonstrator, Mr. Cherry.

Instance after instance might be cited to show how limited is our knowledge, how abundant the field open to inquirers. There is room for all tastes and all degrees of capacity. In the department of histology much

useful information can be gleaned by any one endowed with patience and the faculty of accurate observation; while the higher problems of pathology furnish full scope for the finest intellect.

It is impossible for me within the limits of this address to do more than touch upon the vast departments of pharmacology and therapeutics. How far we have travelled from the mediæval period, with its nauseous mixtures in which all things foul and fair were huddled together! How far even from the pre-Victorian age, with its routine bleedings and purgings, and its complex prescriptions, which were multiple assaults on symptoms rather than remedies for disease. The great aims of the modern practitioner are precision and directness. Take for example a peptonoid tablet, the surface of which is made of pure pepsin to reinforce the gastric ferment, while within, under a coat of keratin, not acted upon in the stomach, is some pure zymine, which will pass with the food into the duodenum and assist in pancreatic digestion. I do not vouch that these objects are attained, but it is something to find an attempt to aid the normal processes of digestion stage after stage. The greatest triumphs of pharmacology are undoubtedly found in the antiseptic system of surgery, and in the scientific use of disinfecting agents. But of these it is not now the time nor the place to speak. Let me, however, remind you of a few great advances made in recent years.

Long ago Pasteur proved that he could protect susceptible animals against hydrophobia by subcutaneous injections of a special vaccine. Evidence has steadily accumulated that by this vaccine the development of hydrophobia can be prevented in persons already inoculated with the virus of rabies. But it was only in the present year that Professor Murri, of Bologna, succeeded in curing a case of actual rabies, in which paralysis was already strongly marked, by the direct introduction of Pasteur's vaccine into the blood.

Concerning tetanus, we have learnt that the disease is due to a bacillus, shaped like a drumstick, which is widely diffused in surface soil, especially when contaminated with organic matter. The cultivation of this bacillus was at first attended with great difficulty, as it seemed absolutely anaerobic. All the early cultures were obtained in an atmosphere of pure hydrogen. But Kitasato found that it could be grown with free access of oxygen, if a percentage of grape sugar were added. In the body the bacillus is found only at the point of inoculation. The symptoms are due to the toxins elaborated by it, which are formed very slowly, and diffuse very gradually into the system, their formation being aided by the presence of certain other microbes. It is possible to protect rabbits against tetanus by rendering them accustomed to these toxins. The special vaccine consists of a solution of the toxins heated to 140° Fahr., or treated with terechloride of iodine, or with iodine itself. The serum of rabbits so rendered immune contains an antitoxine, which has the power of destroying large quantities of the toxins of tetanus. Guinea-pigs, which are highly susceptible to the disease, may be protected by the introduction of two cubic centimetres of such serum; and Behring and Kitasato finished their invaluable researches by curing guinea-pigs already convulsed with tetanus by the introduction of similar serum. Tizzoni and Cattani, of Padua, have obtained the antitoxine in the solid state by precipitating the serum with alcohol and drying *in vacuo*. Four cases of severe tetanus in man have been cured by hypodermic injections of the antitoxine so prepared. The toxin is apparently converted directly into antitoxine when mixed with the corpuscular juice expressed from the thymus gland.

The tuberculin introduced by Koch has disappointed most of those who have employed it. In regard to surgical tuberculosis, Watson Cheyne concludes that "on the whole, considering the indefinite length of time that the treatment must be continued, and the danger of leaving it off, it does not come into play in those cases of external tuberculosis which are accessible to other local measures." The greatest success is claimed in tuberculosis of the larynx. Ehrlich's paper, published in the *Lancet*, puts the general case in favour of tuberculin as strongly as possible. Koch continues sanguine, and has prepared a purer form of tuberculin, free from by-products, with which he hopes to obtain better results. The doses now recommended are very small. It must be borne in mind that the use of tuberculin was based on Koch's assertion that he had by its action arrested the progress of tuberculosis in guinea-pigs. The details of his experiments have not been published. Other observers have failed to obtain any such results. Pfuhl, working in Koch's laboratory, found that small doses of tuberculin, either alone or combined with other treatment, produced no marked effect in inoculated guinea-pigs; but he claims to have been more successful with large doses. In his opinion local reaction is essential. But all the animals experimented upon by him died of tuberculosis, and the success of the treatment consisted, at most, in a slight mitigation of the disease. Metchnikoff and Roux, in a prolonged series of experiments, found that tuberculin, whether in small or in large doses, is powerless to cure tuberculosis in guinea-pigs. In connection with the use of tuberculin and all such substances, it is necessary to bear in mind the warning given by Roux: "The injection of products of microbes is not without danger, even when the dosage is restrained. Some, which are well borne at first, cause late troubles, inducing degenerations that may prove fatal." It may be noted that Pfuhl, in his experiments on guinea-pigs, employed mercurials and other agents as adjuvants to the tuberculin injections. Mr. T. N. Fitzgerald has a strong belief in the remedial power of mercurials, in small doses, in incipient tubercular affections, especially of joints, and in my opinion these drugs, wisely used, are valuable accessories to other treatment.

Much has been learnt concerning the history of the tubercle bacillus in the body, *teste* the excellent account given by Cornil and Babes in "Les Bactéries"; but possibly much remains to be discovered touching its life outside the body. Mr. Candler, of Melbourne, has for many years laid stress on the logical necessity for a saprophytic existence of the bacillus external to the living organism. Nocard and Roux, in 1887, showed that the bacilli would grow freely on blood-serum or agar agar, or in broth to which 6-8 per cent. of glycerine had been added. Paulowski succeeded in obtaining cultures on potato. It is now known that in glycerine broth the bacilli will grow, though slowly, at comparatively low temperatures, such as 18°-20° C. Woodhead states that earlier generations so cultivated produce typical tubercles in inoculated animals; but that after several generations have been developed, their virulence may be diminished, although the growths show no loss or even a gain in luxuriance. Hence he remarks that "we have in fact a kind of reversion to the saprophytic condition of the culture, a condition accompanied by diminished parasitic virulence." Cornet's researches concerning the prevalence of the bacillus in the external world obviously need repetition on a much wider basis.

As regards diphtheria, Roux and Yersin have proved that it is due to the Klebs-Loeffler bacillus, that the bacillus is confined to the local lesion, and that all the constitutional symptoms are produced by a soluble poison formed

by the bacilli. Reference has already been made to Martin's further researches concerning the nature and action of this poison. A vaccine may be prepared by heating a broth culture of the bacilli for one hour to between 65° and 70° Cent. Guinea-pigs inoculated with such attenuated cultures resist the most virulent bacilli when introduced under the skin. As usual in such cases, immunity is not gained at once, about a fortnight being necessary for the mitigated virus to do its work within the system. Attenuated cultures may again be made virulent by growing them along with various micrococci, such as those of erysipelas, or those found in the throat in measles or scarlatina. Roux and Yersin hold that such attenuated microbes are widely distributed in nature and readily regain their toxic power. These researches give us hope that a remedy will soon be found for the most virulent forms of diphtheria. There is encouragement for the larger hope that all the infective diseases, which levy so large a tax on human kind, a tax of death, disease, and sore distress, will speedily be brought more and more under subjection. Another illustration is also afforded of the theory of the origin and disappearance of epidemics enunciated by Pasteur in 1881. Of all the vast additions to our knowledge to which I have referred, how much has sprung from Pasteur's work and Pasteur's influence. *Hommage à Pasteur!* Glory and honour to his name!

The Position of the Vermiform Appendix.

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IN view of our increasing knowledge of the pathology of some forms of localised inflammation in the neighbourhood of the cæcum, and the more frequent operations for removal of the vermiform appendix, as being in many cases the seat of origin of the said inflammation, we have been making a series of observations on the position and relations of that structure, and we give here the result of our examinations of 100 bodies in the *post-mortem* rooms of the Sydney and Prince Alfred Hospitals. First of all, one of the most important points, at least from the surgeon's point of view, is the relation of the appendix to the peritoneal cavity. There is no doubt that, in a very large proportion of cases, the appendix is distinctly intraperitoneal. In only *one* case out of our 100 was it extraperitoneal. Our observations on this point agree with those of Treves, who examined 100 bodies in the *post-mortem* room of the London Hospital, especially with a view to the anatomy of the peritoneum and mesentery. In his Hunterian lectures before the Royal College of Surgeons, in 1885, he states that he found the vermiform appendix intraperitoneal in every case. In contrast to this statement we have that made by Ferguson, of New York, who says that out of 260 bodies examined he found the appendix extraperitoneal in seventy-seven. We can hardly understand these figures, and as they are so widely at variance with all other statistics, we can only suppose that there must be an error in them somewhere. It is unnecessary here to do more than mention the importance of recognising this relation of the appendix. Inflammation and perforation of it must give rise to peritonitis more or less extensive and dangerous. Then, secondly, as to the relation of the appendix within the peritoneal cavity. Treves in his lectures, already referred to, concludes from his observations, that the most frequent position is that in which the appendix is found lying under the inferior layer of the mesentery, directed upwards and to the left in the direction of the spleen. The next most frequent position he found to be that in which the appendix lies quite free behind the cæcum, and directed upwards. He found this in eighteen out of his 100 cases.

Lockwood and Rolleston, in a paper in the *Journal of Anatomy and Physiology*, October, 1891, on the anatomy of the peritoneal pouches around the cæcum, give the result of the examination of 160 consecutive cases. They state that the appendix is most frequently found lying on the brim of the pelvic cavity. They also found it in a large number of cases in one of two other positions, viz., either with a long meso-appendix lying to the right of the cæcum, and ascending colon, running upwards and parallel to the colon, over the kidney, towards the right lobe of the liver, or lying free over the cæcum or colon. We agree with Lockwood and Rolleston, in regarding as the most frequent position of the appendix, that in which it is found lying over the brim of the pelvis and dipping downwards into the pelvic cavity.

This position we found in fifty-eight out of 100 cases. According to our observations the next most frequent position is that corresponding to Treves' second, viz., lying behind the cæcum and directed upwards, and slightly outwards. This also corresponds with one of the positions given by Lockwood and Rolleston as a comparatively common one. We have found but nine instances of what Treves regards as the most common, viz., where the appendix is directed upwards, and to the left, towards the spleen. These observations are at variance with what is asserted, at any rate, in most of the text-books on anatomy, viz., that the appendix usually lies behind the cæcum, and directed upwards and slightly inwards. We submit a more detailed account of our observations:—Of the 100 cases examined, 72 were males, 28 were females. The ages ranged from 21 months to 77 years. The shortest appendix measured $1\frac{1}{2}$ inches in length and the longest appendix measured 7 inches. Average length was 3·8 inches, only 29 were over $3\frac{1}{2}$ inches in length. Of the females alone the shortest was $1\frac{1}{2}$ inches, the longest was 5 inches; average length in females was 3 inches. As to position:—In fifty-eight cases it was lying directed inwards along the brim of the pelvis, and dipping over into the pelvic cavity. In twenty-eight cases it was lying coiled up behind the cæcum, and directed slightly outwards. In nine cases it was directed inwards, slightly upwards towards the spleen. *One* was shut off by old adhesions behind the cæcum. *One* was perforated, bound down by old adhesions, lying along the brim of the pelvis and pointing inwards. *One* was lying beneath the right lobe of the liver, pointing upwards and inwards behind the gall bladder. In this case the intestines were displaced by a general sarcomatous infiltration of the mesenteric glands. In *one* case the appendix came off the end of the cæcum, on its anterior surface, then coiled round below the end of the cæcum, and was directed upwards towards the liver. In *one* case only was the appendix extraperitoneal. It lay directed transversely inwards between the layers of the peritoneum reflected off the ileum, which formed the mesentery of this portion of the intestine.

Recent Progress in Construction of Microscopes.

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I. OPTICAL PARTS.

A. Lenses.

THE problem of procuring to images, at the same time high magnification and distinctness, is practically solved by the construction of so-called apochromatic lenses (introduced by Prof. Abbe, from Zeiss' factory in 1886). They deserve to be considered a suitable standpoint, from which to hold a review over the whole course of development of microscope lenses. Generally it may be said, that according to dioptric laws, the degree of *magnification* of a lens is expressed by the quotient: mean distance of distinct vision, divided by the focal length of the lens; that the *distinctness* of an image depends upon its brightness, and this upon the amount of light that enters the lens.

Now, of *simple lenses* (nowadays used in dissecting microscopes, in magnifying glasses, &c.), only those giving a small magnification can be used with advantage. On account of the disturbances by chromatic and spherical aberration, which in lenses of a strong curvature are greater than in those of a small curvature, and more prominent in the marginal parts of the visual field than in the central parts, it was necessary to exclude the marginal parts of the lens. If this be done in *weak* lenses—that is, lenses of a slight curvature, of a long radius, of a great focal distance and therefore small angle of aperture—the pencil of rays entering the lens remains thicker, but in strong lenses it becomes smaller than the pupil of the eye, and according to dioptric laws, in such case the brightness of the image decreases in proportion of the square of the diameter of the illuminated plane of the lens, to the square of the diameter of the pupil. Of simple lenses, therefore, only such could be made use of, the aperture of which was a certain division of the focal distance—*i.e.*, lenses giving a small magnification. Two remedies offered themselves—*A.* increase of intensity of illumination; *B.* widening of angular aperture, based upon correction of the spherical and chromatic aberrations. The first advance in this direction that deserves to be mentioned is the replacement of lenses of a great curvature (or, what amounts to the same, of a high magnification, of a small focal distance), by a combination of two or three lenses, of smaller curvature (of lower magnification, of larger focal distance). The result was, a good image—*i.e.*, an image bright, and fairly free from the disturbances through spherical aberration, up to magnification of 2 to 300 diameters. The chromatic aberration, however, was hardly influenced at all; there still remained red or violet fringes round the outlines of the image, according to one's focusing for violet or red rays.

The introduction of so-called achromatic objectives by Amici was the first decisive step to remove the disturbances arising from this source. A crown glass convex lens was glued to a flint glass concave lens, and several such pairs were combined to form object glasses. Crown glass has a high refractive power. Flint glass a small one, thus the addition of the latter

did not materially decrease the magnification of the magnifying lens. Again, crown glass possesses a small, flint glass a high dispersive power; thus in the lateral parts of the lens, where the dispersion is considerable owing to the rays falling upon the lens in an oblique direction, it was possible to remove the dispersion of the crown glass by the strong contrary direction of dispersion of the flint concave. Such was the theory; practice, however, taught otherwise. The red and violet fringes had disappeared, green and purple ones occupied their place; only the extreme colours of the spectrum were corrected, their rays only were united into one point, not so the intermediate colours. There remained a chromatic aberration of a second degree, the effects of which upon the image has been called the secondary spectrum. However, by various methods, based more upon empirical than upon scientific experiments, by, for instance, slightly varying the curvature of lenses or by altering the distance of pairs, or by giving an additional correction to the eye-piece, good opticians succeeded in constructing microscopes which allowed very satisfactory work to be done, so long as the magnification did not exceed 700 diameters. Above this limit one had to contend with the secondary spectrum, or with insufficient light, or, finally, with the smallness of the focal, that is, working distance. This last cause rendered it absolutely impossible to obtain distinct images, even with very small differences of thickness of cover-glasses, unless a special adjustment was provided, which allowed one to accommodate the focal distance of the system to cover-glasses of various thickness. This adjustment is accomplished by shortening or lengthening the distance of the front lens from the other lenses of the system, by means of the so-called screw-collar. A further remarkable discovery was made in 1859, when Hartnack and Nachet carried out a suggestion, previously made by Amici in 1850, *i.e.*, to construct an objective for light, passing from the object through water, instead of through air, to the lens. The advantages obtained by the water immersion system are:—(1) The image becomes brighter, for the rays passing from glass to water are less deflected than when passing from glass to air, and therefore meet the surface lens in a less oblique direction. Now, the loss of light by reflection increases with the obliquity of rays, and so through water immersion the image is made brighter. (2) The immersion system allows of a greater working distance between the objective and the object. (3) The observer is rendered less dependent upon the exactness of correction for thickness of cover-glasses, in consequence of the increase of working distance, and because the negative aberration (*i.e.*, the aberration of rays in passing from the object through the differently reflective medium of glass) is greatly diminished; however, for water immersion systems of very large aperture, the cover-glass correction by a screw-collar cannot be avoided.

This was not achieved until before 1878, when, upon suggestions of Wenham and Stephenson, Zeiss and Abbe introduced the homogeneous immersion systems—*i.e.*, objectives to be used with oil of cedar put between them and the cover-glasses. The refractive power of this oil and glass being the same, rays fall upon the front surface of the system, in the same direction as they leave the cover-glass, and the advantage derived therefrom, is, increase of angular aperture, *i.e.*, of brightness of the image, increase of working distance, increase of magnification, and independence of the thickness of cover-glasses.

The latest improvement on microscope lenses, the apochromatic system, was introduced from Zeiss' factory by Abbe, who, in 1886, published a paper *Verbesserung des Mikroskopes mit Hilfe neuer Arten Optischen Glases*, the principal points of which read as follows:—Even in the best achromatic

dry and immersion systems, the magnification was a limited one, through the impracticability, or even impossibility, of using a high amplification of the image formed by the objective. The image was not bright enough, as the aperture, although far larger than in older systems, could not be increased furthermore, owing to the disturbances by chromatic aberration. There were in achromatic systems two sorts of chromatic aberration, (1), the secondary spectrum, purple and green fringes, as only the two extreme colours of the spectrum were corrected and their rays united in one point; (2), the spherical difference of chromatic aberration, *i.e.* the aberration arising from rays of different colours suffering a different refraction in different parts of the system. This aberration could be corrected for one colour only; it was removed for the middle of the spectrum, but there remained a spherical over-correction for blue and violet light, and an under-correction for red light. Both the defects grew more distinct the larger the aperture and the higher the eye-piece magnifications were. The new apochromatic lenses are made from new sorts of glass—glass which has as a basis boric and phosphoric acid, instead of silicic acid of the old glass. The new apochromatic systems have almost the same refraction for all colours of the spectrum, and therefore remove the secondary spectrum, leaving only very little chromatic aberration, which is practically of no importance at all. But, at the same time, these new systems have a far better compensation for the spherical difference of chromatic aberration. This having nothing to do with the chemical constitution of the glass, and depending entirely on the formation of the refractive surfaces of the lenses composing the system, has been achieved by deliberately taking a lens of great spherical aberration, and correcting it afterwards by other lenses. The practical effect is, that the images show a freedom from colour disturbances, with oblique and central illumination hitherto not seen, and such a degree of brightness, that a strong eye-piece amplification may be used without seriously impairing the sharpness of the image. And if the new apochromatic systems be compared with the old achromatic systems, one can say that an apochromatic dry system fulfils the work of an achromatic water immersion, and an apochromatic water immersion the work of an achromatic homogenous immersion system of the same nominal aperture. Further, whilst in the achromatic systems the eye-piece magnification could not exceed a magnification of 4 to 6, in the apochromatic systems it may go up to 15 or 18 for high objective magnifications. For small objective magnifications, Zeiss has constructed an eye-piece that magnifies 27 times. Therefore the same objective answers well for low or high magnifications; it suffices to change the eye-pieces. And if it be possible to attain a high magnification with a weak objective, one can work much more easily with high magnifications, as one has to do with a relatively large focal length, or working distance. Finally, one might say that only after the introduction of the apochromatic lenses, micro-photography with high powers could rise to existence and importance, for, in the achromatic systems, there was a great difference of focal distance for optical and chemical rays, and therefore a great difficulty in focusing for photography. Then the systems were as far as possible, corrected for optical rays, and had accordingly a strong spherical over-correction for rays lying near the violet of the spectrum, so that, as a matter of fact, there was no focus at all for photography. In the apochromatic systems the focus of the optical and chemical rays is almost identical, so that by focusing in the ordinary way, one focuses at the same time for a sharp photographic image. The latter is not only theoretically—according to the shorter wave lengths of the chemical rays—but also practically a better image than the one the eye is able to perceive.

As pointed out above, apochromatic object pieces are characterised, not only by the chemical constitution of the glass of their lenses, but also by having a deliberate spherical aberration, which is corrected through an opposite aberration being given to the lenses of the eye-pieces. To do the same with achromatic systems was impossible, for, in them, the difference of magnification for different colours is not the same in the centre of the lens and in the extra-axial parts, whilst in the new glasses this difference of coloured magnification keeps the same amount for all parts of the aperture. Further, in the old glasses, increase of refractive power was intimately connected with increase of dispersion, whilst in the new glasses they are more independent of each other.

The question naturally arises:—What is the largest *aperture* hitherto attained, and can it be still further increased? The aperture of a simple lens means ratio between the diameter of its clear opening, and its focal distance; the aperture of a compound dry system means ratio between the absolute (that is actually used) diameter of the back lens, and the focal distance. This ratio is in both cases equal to the sine of the semi-angle of aperture. However, the *angle of aperture* suffices only for a comparison of systems of the same sort. To compare a dry system with an immersion system, it is necessary to take into consideration the refractive power of the interposed media for which the systems are constructed, as rays which are so much deflected that they cannot enter the lateral parts of a dry system, will enter an immersion system. The *numerical aperture*, i.e., the product of the sine of the semi-angle of aperture, and the refractive index of the interposed medium allows of such a comparison between systems of different sorts. The question is therefore modified to:—What is the greatest *numerical aperture* hitherto obtained, and can it be further increased? The strongest achromatic homogeneous immersion system reached a numerical aperture of 1.30 to 1.35; the strongest apochromatic homogeneous immersion system 1.40. But Zeiss has constructed an apochromatic system of 1.60 numerical aperture. This system of 1.60 numerical aperture is a special sort of homogeneous immersion system, inasmuch as an immersion fluid of a higher refractive index—monobromnaphthalin—and cover-glasses, slides, illuminating condenser, and lenses of a higher refractive index are used in connection with it. At the outset it was very difficult to form such strongly refractive glass; cover-glasses for instance, which are usually blown, have to be sawn, ground down to a certain thickness, and then polished, but the principal difficulty was to find an immersion fluid that possessed a higher refractive power, and was also suitable in other respects, viz.:—transparent, not too viscous, not inflammable, not injuring the glass, &c. It was the difficulty in obtaining such a fluid that had prevented a further increase of angular aperture. By means of the greater variety of optical glasses which allowed a correction for spherical aberration, independently of chromatic aberration, and *vice versa*, these can be removed so well that they, on their part, do not exclude a larger aperture, nor is an increase of density of glass an insurmountable obstacle, but a suitable immersion fluid has to be found out. Still the ordinary apochromatic oil immersion system means a considerable advance. Instead of a dark and undefined image, with a magnification of 1,300 diameters, one now gets a bright and distinct image, with a magnification of 3,000, without a shortening of working distance. Of course this increase of magnification is not directly due to object-piece magnification, but to over-magnification through the eye-pieces.

Turning now to the improved eye-pieces (the so-called compensating eye-pieces), it is said already, that they differ from the Huyghenian eye-pieces, by part of the correction of chromatic aberration (*i.e.*, the correction of the spherical difference of chromatic aberration) being supplied by them. Another difference is that the eye-piece magnification has been increased twice or more. Eye-pieces of the old type, with a magnification of 18, would have an eye-lens of very small diameter, and its upper focal plane lay so near the lens that one had to approximate the eye close to the instrument, and which was very inconvenient. The new eye-pieces excel through the equality of the distance of the eye-point for all magnifications, and the large area of the eye lens. Another difference is that instead of the nominations of the Huyghenian eye-pieces 1, 2, 3, 4, 5, which served only to mark the difference between low and high magnifications, in the compensating eye-pieces the numbers at once give the degree of ocular amplification for the standard length of tube. Hence the amplification for any other length of tube can easily be deduced, and with the focal distances of the object glass (which is engraved on each object piece) the total magnification of the object under view be determined.

B. Illuminating Apparatus.

For transmitted light Abbe's illuminating apparatus has come into general use. Two modifications are used, namely,—a double lens system of 1.29, and a treble lens system of 1.40 numerical aperture. The latter is specially adapted to homogenous immersion. If one puts a drop of cedar oil between condenser and slide, light is made use of which otherwise would be lost by deflection. Connected with the condenser system is the iris diaphragm, by means of which any part of the pencil of rays can be excluded or admitted to the condenser, and the direction of light be varied and modified.

II. MECHANICAL PARTS.

The mechanical parts of the microscope are viewed quicker, easier, and better than described. The main points are always:—(1) Allow of a great variety of illumination, iris diaphragm, &c. (2) Make working as convenient as possible. In this respect the new method of changing the objectives deserves attention. The revolving nose-pieces did not allow more than four objectives to be used; the sliding objective changer, permits the use of any number of glasses, and it does not take more time to change the objectives if they are once properly centred. Working with very high powers is considerably facilitated by the movable stage. It can be easily attached to, and removed from the stand, and allows a special portion of the preparations to be brought to a particular region of the visual field. For micro-photography, and for demonstrations with a projection apparatus a movable stage of some form cannot be dispensed with. (3) It is further of the greatest importance that all optical parts are exactly centred; for instance the small screws one observes on the sliding objective changer, the spring on the iris diaphragm, &c., serve this purpose. Finally, we must expect a modern microscope to be so constructed, that it may be used for various modifications of microscopical seeing, for micro-photography, spectroscopical projection, &c., or in connection with the drawing-apparatus.

Two Cases of Congenital Malformation of the Heart, with remarks and illustrative figures.

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IN the following paper I wish to describe two raro forms of congenital abnormality affecting the heart and the arterial trunks arising from it. Before going on to the description I would like to refer very shortly to certain stages in the development of the heart, which bear directly on the formation of the conditions. I shall begin at the stage in which the heart consists of two cavities, a single auricle and a single ventricle, communicating by means of a single auriculo-ventricular opening.

Fig. 172 A.B.C., Quain's Anatomy, vol. 1, Part 1, shows the ventricle becoming divided into right and left cavities. The septum (*septum inferius*) begins about the seventh week as a muscular ridge growing npwards and backwards from the antero-inferior part of the cavity. As this proceeds, the auriculo-ventriclnar opening is observed to shift in position from the left side of the posterior surface to near the middle of the posterior snrface. On reaching the level of this opening the septum inferius ceases to grow, and the division is only completed by the down growth of the *septum bulbi*. This septum divides the aortic bulb into two trunks (the aorta and pulmonary artery). It begins about the seventh week, and proceeds from the distal end of the bulb towards the septum inferius. Until the two unite there is a communication between the right and left cavities.

The common anricular cavity is subdivided by a septum (*septum superius*) growing from above downwards and forwards towards the auriculo-ventriclnar opening.

Fig. 173 B., Quain. Here it joins an endocardial cushion, which divides the opening into right and left portions (*septum intermedium*). Before this junction takes place, however, a secondary aperture appears in the growing auricular septum, and forms the *foramen ovale*, which is not again closed till birth.

Fig. 182, also from Quain, shows the normal arrangement of the great vessels. The aortic bulb is divided into aorta and pulmonary trunks. The fourth left branchial arch forms the aortic arch, and the fifth ditto the pulmonary artery and ductus arteriosns.

The first specimen, shown in fig. 1, was obtained from a boy $2\frac{1}{2}$ years old, who died of diphtheria in the Children's Hospital. His mother said he had always been of a blue colour, and that he suffered from breathlessness on exertion. There was clubbing at the finger ends, and on auscultation a loud systolic bruit, conducted npwards from the base of the heart was to be heard. The description of the heart is as follows:—The auricles are normal; the auricular septum is complete, with the expection of a very small opening at the upper part of the fossa ovalis. Each auriclo communicates with the corresponding ventricle by a normal auriculo-ventricular opening. The *ventricles* are well formed (left thicker than right), but the septum is deficient at its upper part, in the position of the *pars membranosa septi*. A communi-

cation is thus left between the two cavities, large enough to admit the tip of the little finger. Arising from the base of the ventricles immediately over the aperture is a large arterial trunk, which thus communicates equally with both ventricles. This trunk forms the aortic arch which passes over the roof of the left lung and has the branches arising in the ordinary manner. There is no trace of a pulmonary artery or ductus arteriosus and unfortunately the manner in which the lungs were supplied was not ascertained. Probably this took place through enlarged bronchial arteries arising from the descending aorta.

A great many cases of obliterated pulmonary artery have been recorded, and, in most of these, deficiencies in the auricular and ventricular septa existed. In the majority, however, the ductus arteriosus remained patent, connecting the aortic with the right and left pulmonary arterial branches, and thus formed the channel by which the lungs were supplied. In regard to the transition between this condition in which the ductus arteriosus is patent, and that which I am describing, I may mention the following:—

- (1.) The case of Dr. Moore (*Australian Medical Journal*, March, 1892), in which the trunk of pulmonary artery was represented by a fibrous cord, and the lungs were partly supplied by a pervious ductus arteriosus. Here the right lung received in addition a small branch from the termination of the aortic arch. Peacock (*Malformations of the heart*), mentions a similar case.
- (2.) The case of Cruveilhier (quoted by Turner, *Med. and Chir. Review*, 1862). In this only a rudiment of the pulmonary artery and ductus arteriosus remained, and the lungs were supplied by the branches arising from different parts of the aorta, probably, he says, enlarged bronchial arteries.

In the present case, however, there was no trace of a pulmonary trunk or ductus arteriosus, and although the actual source of the pulmonary blood supply was not ascertained the condition was probably like that in Cruveilhier's case. The only exactly similar case of which I have so far discovered any record is that of Hervieux (*L'Union*, vol. 66, 1861), quoted by Perls "Allgemeine Pathologie," p. 308. He describes the case of a boy 10 days old, "who remained for several days quite free from cyanosis and in whom both the pulmonary artery and ductus arteriosus were completely lacking, so that the lungs could have been supplied with blood only through the bronchial arteries." This condition is due evidently to non-development of the fifth left branchial arterial arch. The septum bulbi has failed to meet the septum inferius and thus a deficiency exists in the ventricular septum in the position of the pars membranosa.

The second specimen, consisting of the heart with the lungs attached, was obtained by Dr. John Gibson, of Windsor, from a child who lived two weeks. During this time cyanosis, rapid breathing, and rapid action of the heart were noticed, but no bruit could be heard. The heart was exhibited by Dr. Purser, of Prince Alfred Hospital, at a meeting of the Students' Medical Society, and was presented to the Anatomical Museum of the University of Sydney. By Dr. Purser's permission I am enabled to record the case along with the following. In this case, fig. II, the *left auricle* (A) is small, receives the right and left pulmonary veins as single trunks, and communicates with the right auricle through a patent foramen ovale. This, however, is partially closed by a crescentic fold, projecting from the posterior margin, and deflected towards the right auricular cavity. The foramen ovale forms the only communication with the rest of the heart, as there is no left auriculo-ventricular opening.

Fig. I.

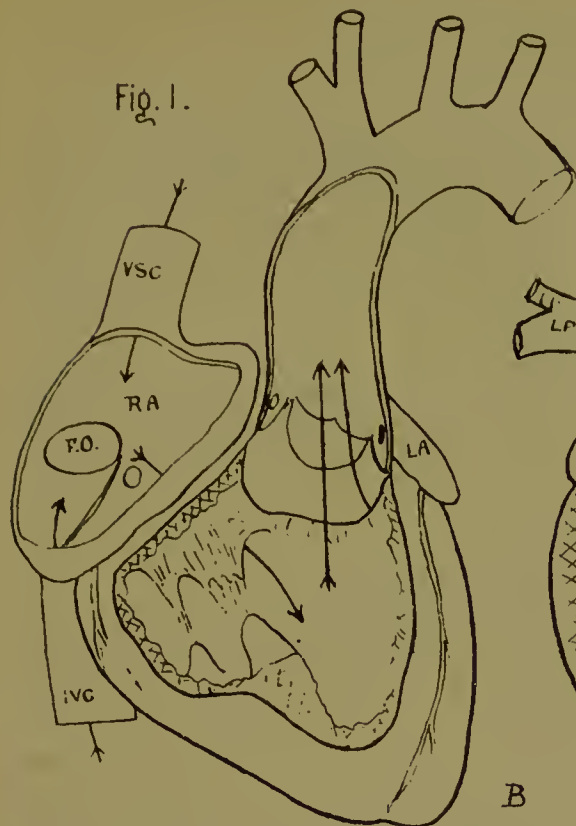
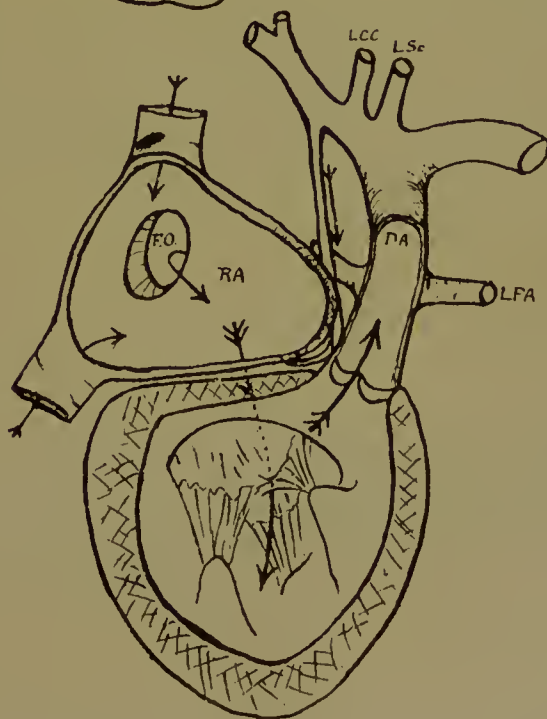
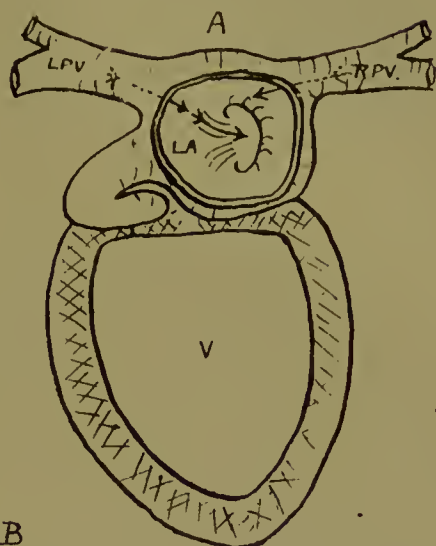


Fig. II.



(12 • 12 - 93)

Fig. I.—Semi-diagrammatic representation of Heart in Case I. The right auricle and ventricle and part of the aorta have portions of their walls removed. The two arrows entering the great arterial trunk are pointing from the right and left ventricles respectively, the free edge of the septum ventriculorum separating them. (Other refs. see under.)

Fig. II.—A and B. Semi-diagrammatic representations of the Heart in Case II. A shows left auricle opened from behind; B shows rest of arrangements. The greatly reduced proximal portion of aorta is seen to the left of the arterial trunk labelled D.A. and forms a coronary arterial trunk.

(Reference letters in figures.) R.A., right auricle; F.O., foramen ovale; D.A., ductus arteriosus; L.P.A., left pulmonary artery; L.C.C., left common carotid; L.Sc., left subclavian; L.A., left auricle; R.P.V. and L.P.V., right and left pulmonary veins; V., ventricle; V.S.C., vena cava superior; I.V.C., vena cava inferior.

The *right auricle* (n) is large, and receives the superior and inferior venæ cavæ in the usual way. On the septum is seen the patent foramen ovale, and below is the auriculo-ventricular opening. The *ventricular portion* of the heart (n) consist of a single cavity, with thick muscular walls and without any trace of a septum. At the base, near the centre, is a large auriculo-ventricular opening, communicating above with the right auricle, and guarded by a bicuspid valve. In front and to the left of this is the conus arteriosus leading up to the origin of the large trunk of the pulmonary artery. The opening is guarded by three semilunar valves. About an inch from its origin the trunk gives off right and left pulmonary arteries, and is continued on as the widely patent ductus arteriosus to join the aortic arch. The ascending or proximal portion of the aortic trunk, though distinct, is extremely attenuated, and appears as if it were merely a rounded cord. It is connected with the base of the ventricle to the left of the pulmonary trunk, but has no opening of communication with that cavity. The cord itself, however, is pervious and forms a channel or common trunk for the supply of blood, by reflux from the transverse part of the aorta, to the coronary arteries which arise from it, one on each side, at the base of the ventricle. The *branches* arising from the transverse portion of the aortic arch are regular in arrangement, though proximally to the communication with the ductus arteriosus, the calibre of the arch itself is abnormally small. The innominate arises close to the point where the atrophied ascending aorta joins the transverse portion. The left subclavian arises opposite the patent ductus arteriosus, and the left common carotid takes its origin between the two former branches, all three being close together. The remainder of the arch, distal to the junction of the ductus arteriosus passes backwards over the root of the left lung to form the descending aorta.

The obvious interpretation of the arterial conditions here is that we have an arrangement almost exactly the converse of the former case. For here the pulmonary trunk and ductus arteriosus are large and pervious, while the aorta is reduced to a small vessel just large enough for the coronary supply.

Cases of this kind where the aorta is narrowed or obliterated are of much less common occurrence than those in which the pulmonary artery is concerned. When it does occur the narrowing is generally situated at the isthmus aortæ, viz., just proximally to the junction of the ductus arteriosus. At this part the aorta is normally constricted to a certain extent up to the time of birth.

I have only been able to find two cases similar to the above recorded. One by Romberg (*Edin. Med. and Surg. Journal*, vol. 33, p. 268), the other by Cantor (*Path. Trans.*, vol. 2, 1830, p. 38). Both of these are mentioned in Peacock's work on malformations of the heart. In each case the aorta was obliterated at its orifice but patent above. The conditions in the interior of the heart varied.

On the Closure of the Central Canal of the Spinal Cord in the Foetal Lamb.

(With two illustrations and demonstrations of microscopical preparations.)

J. T. WILSON, M.B., Edin.

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A LARGE number of observations have been made respecting the manner in which the embryonic spinal central canal undergoes the great proportionate reduction in size which occurs during its progress towards the fully developed condition, and the statements of various investigators are, on this subject, of a partially conflicting character.

A summary of the various views which have been put forward is given by Robinson in a paper upon "The development of the posterior columns, of the posterior fissure and of the central canal of the spinal cord," in vol. I, of the "Studies in anatomy from the Anatomical Department of the Owen's College," 1891. That summary slightly amplified and otherwise modified may be here reproduced.

Balfour ("Comp. Embryology," vol. II, 1881, p. 334.) states that on the seventh day (in the chick) the epithelium forming the roof of the posterior canal is absorbed, thus transforming the canal into a wedge-shaped fissure whose mouth is seen to be partially closed by a triangular clump of elongated cells, below this mass of cells the fissure is open. It is separated from the "true spinal canal" by a very narrow space along which the side walls have coalesced. In the lumbar and sacral regions the two still communicate.

In the 1885 edition of the same work (vol. II, p. 418), the above statement is quoted, and the author goes on to say, "It seems to me probable, though further investigations on the point are still required, that the dorsal fissure is a direct result of the atrophy of the dorsal part of the central canal of the spinal cord. The walls of the canal coalesce dorsally, and the coalescence gradually extends ventralwards so as finally to reduce the central canal to a minute tube, formed of the ventral part of the original canal. The epithelial wall formed by the coalesced walls on the dorsal side of the canal is gradually absorbed." This was written in view of the work of v. Kölliker. This author ("Entwickelungs-geschichte des Menschen und der höheren Thiere," Leipzig, 1879, p. 587) held that there is evident atrophy of the central canal from behind forwards (*i.e.*, dorso-ventrally) brought about by the great development of the posterior columns.

Barnes ("Development of the posterior fissure of the spinal cord and the reduction of the central canal in the pig." "Proc. Amer. Acad. Arts and Sciences," Boston, 1883-84, pp. 97-110) found that the lumen of the canal is restricted from the dorsal towards the ventral side by a gradual shifting of the cells so that their long axes pass from a direction perpendicular to the median plane into one more nearly parallel with it, as the cells are successively brought into the region of coalescence. Further, he proceeds thus, "There is neither a median coalescence of the side walls of the canal as Balfour and Foster described in the chick, nor is the reduction of the canal brought about by the growth of the posterior columns as Kölliker states, &c."

Waldeyer ("Ueber die Entwicklung des Centralkanales im Rückenmark" Virchow's Arch., 1876, LXVIII, pp. 20-26) held that the obliteration of

the central canal takes place from behind forwards. From right and left round and spindle-cells of the surrounding substance increase and penetrate the narrow part of the canal and fill it.

Vignal ("Sur le Développement des Eléments de la Moelle des Mammifères." Arch. de Physiol., 3e série, 1884, p. 230) concludes that the central canal diminishes both from before backwards and from behind forwards, by the growth of the cells forming the walls.

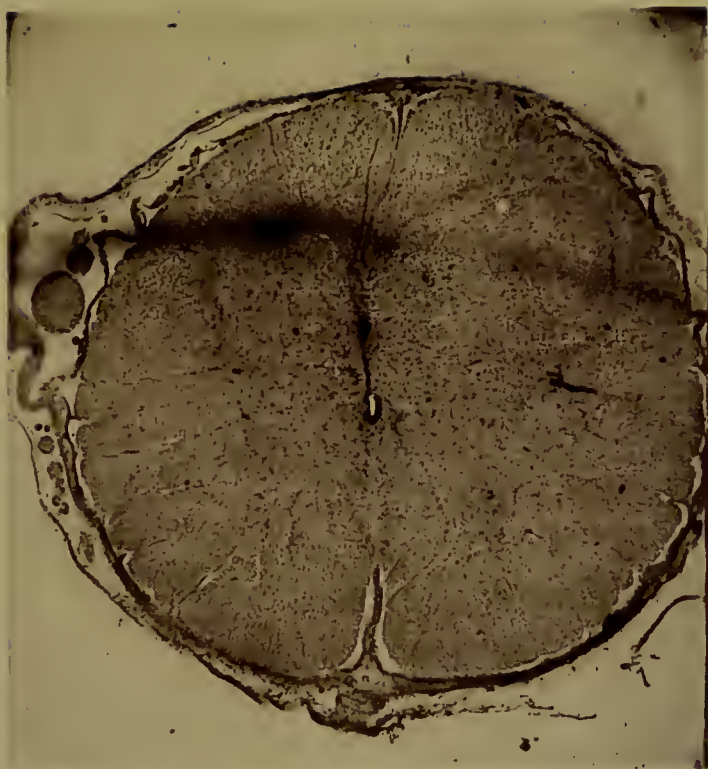
Finally, Robison (*loc. cit.*) arrives at the following conclusions:—"Kölliker's statement, that the reduction in height of the central canal is due to the growth of the posterior columns, is not confirmed by the appearances presented in the developing cords of rats and mice, for the diminution in height of the central canal has commenced before the posterior columns have overlaid the canal, and, therefore, before the growth of these columns could exert any vertical pressure on the dorsal wall of the canal. Neither is the canal reduced in height by fusion of the lateral walls of its dorsal portion, after the manner described by Sedgwick and Heape (Balfour) in the chick, for there is not, at any period in the growth of the cord, the slightest trace of such fusion. It is much more probable, as Vignal has stated, that the reduction is due to the growth of the cells which form the dorsal and ventral walls of the canal, but a consideration of the measurements given in the tables [included in the paper] shows very clearly that the growth of these walls cannot be the only factor, &c."

Having given this preliminary account of the state of opinion hitherto in regard to the questions discussed, I may now draw your attention to the observations which form the subject of this note. In examining sections of the cervical spinal cord of a foetal lamb, at a considerably advanced stage in development (unfortunately I cannot state the precise length of the embryo, but the sections of the cord are themselves about 2.7 m.m. in diameter), I was struck with the appearance presented by the transverse sections of the central canal, and the examination of a series of sections (entire in celloidin) seems to afford positive evidence of the reduction of central canal occurring in a manner entirely coinciding with that described by Balfour in the chick. The condition is represented in the illustrative drawings and in the microscopic specimens submitted. (See plates I and II.) Plate I represents the major portion of the transverse section of the cord. The anteroposterior diam. of the section is a little over 2 m.m. The posterior white columns are seen fairly well developed bounding the posterior fissure, and just ventral to the apices of these wedge-shaped columns is the laterally compressed central canal, which measures about 0.37 m.m. anteroposteriorly. Plate II exhibits the central canal as seen under a higher magnification. Here the compressed canal is seen to be divided by an intermediate constriction into a widely patent ventral portion—the "true central canal,"—and a dorsal portion whose lumen is almost if not quite obliterated, but which yet preserves its inner lining of *cuticula interna*.

In the paper already referred to, Barnes remarks, apropos of the spinal cord in the pig, "In no stage is there any evidence of a direct median coalescence of the facing walls of the canal. If such occurred, we should find, in some sections at least, a keel-like blade of cuticula projecting dorsally from the cuticula interna which lines the roof of the canal at all stages or, in the event that the fusion were to occur more promptly near the centre of the canal than along its dorsal edge, there might even be a vertical blade of the cuticular substance entirely separated from the cuticula lining the roof of the persistent portion of the canal. But such structures are never to be observed, &c." Now it is just such a cuticular structure which comes under

our observation here lining the dorsal moiety of the canal. But altogether apart from this, it is abundantly evident that the canal is undergoing a process of reduction by direct apposition and fusion of its facing walls, just as was believed by Balfour to occur in the chick. The transverse section of the whole canal at this stage bears a close resemblance to a teaspoon in its contour. This form is not, however, to be seen in all the sections. In some the intermediate constricted part has entirely disappeared, and one sees the ventral or "true" central canal separated by a considerable distance from the dorsal portion, which is still quite definitely picked out by the stain, and is in close relation to the apical region of the wedge-shaped posterior columns. In other sections, again, this dorsal moiety of the canal is seen to possess an interesting and, for us, instructive relation to the posterior columns. The latter, by their growth in a ventral direction, have at the level of certain of the sections intruded upon or invaded the region of this dorsal spinal canal. Instead, however, of causing an absorption of the latter structure, as v. Kölliker believed to occur normally, the wedge of the invading column has simply pushed the dorsal part of the canal to one side, so that that part of the section of the whole canal which corresponds to the handle of the teaspoon deviates at an obtuse angle from the middle line, and from the dorso-ventral axis of the rest of the canal. The ultimate destiny of the cells of the epithelial lining of the involuting portion of the canal is, of course, doubtful, but it is not at all impossible that they merely undergo a progressive transmutation into glia cells of the interstitial type which are now known from the researches of Golgi, Ramon y Cajal, but especially Lénhossek and v. Kölliker, to be homologous to the lining epithelium of the central canal to which they originally belong. May it not be that it is from the groups of such glia-cells, derived from the involuted dorsal moiety of the spinal canal, and occupying such an intimate relation to the posterior white columns as to be displaced by their pressure, that the neuroglia tissue of the substantia gelatinosa Rolandi is developed? Such a derivation for the substance of Rolando is in fact suggested in the last edition of Foster's Physiology, pt. III, p. 864, 1890, and supported by reference to the condition in the calf, where Rolando's substance on one side is continuous with that on the opposite side across the middle line, just dorsal to the permanent central canal, and probably is originally continuous with the central gelatinous substance around the latter. So also, according to Corning (quoted in Obersteiner's "Anat. of the Central Nervous Organs," trans. by Hill), "the substantia gelatinosa first appears as a local thickening of the inner layer of the grey matter in its dorsal aspect. This extends outwards over the posterior horn to the point of entrance of the posterior nerve roots. Finally, it divides into two portions, or, rather, the greatly developed cap of the posterior horn breaks away from the original formation which lies in the dorsal well of the central canal." Whether such an interpretation be correct or no still remains to be proved. Meanwhile, the observations narrated in this paper seem to warrant one in believing that Balfour's original statements, which, after review at a subsequent date, he still adhered to, were in all probability founded upon perfectly accurate and positive observations; and further, that although it is doubtless true that, in the pig and in rats and mice, reduction of the spinal canal does not occur by fusion of the adjacent walls, it is not permissible to state that such a method of reduction does not occur in mammals generally. I may add, however, that nothing I have seen would lead one to suppose that the central canal had anything to do with the formation of the posterior fissure, and if it does play such a part it must be at a stage in development considerably anterior to that here dealt with.

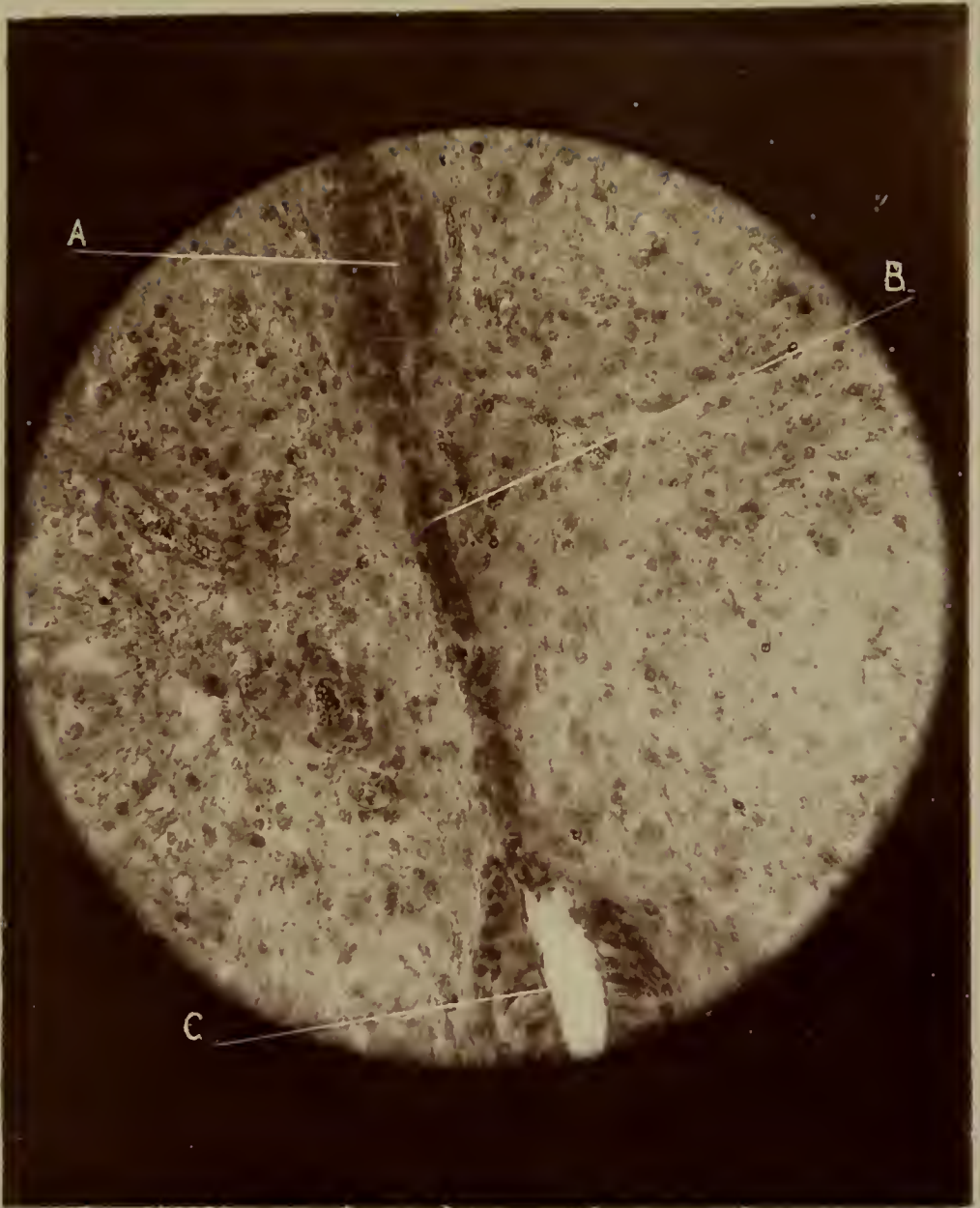
Plate I.



To illustrate Professor Wilson's Paper
on Closure of Central Canal.

Photo-micrograph of transverse section through cervical spinal cord of fetal lamb, cut in celloidin; borax-carmin staining. Zeiss' objective 35MM focal length, without ocular. Magnification of 28 diameters.

The teaspoon-shaped section of the central canal in process of reduction is seen in the centre of the section, the handle of the teaspoon pointing dorsally towards the *septum posterius*. The broad posterior grey cornua are noticeable.



To illustrate Professor J. T. Wilson's Paper on the
Closure of the Central Canal in the Spinal Cord
of the Foetal Lamb.

Photo-micrograph of central area of the same section as is shown in Plate I. Zeiss' apochromatic objective, 16mm, with projection ocular, No. 2. Magnification of 104 diameters.

A—Dorsal moiety of central canal showing remains of *membrana cuticula interna*.

B—Intermediate completely obliterated portion of central canal.

C—Patent ventral moiety of central canal.

(N.B.—The reference lines were drawn upon the negative from which the reproduction was made.)

On a Series of Varieties in Human Anatomy.

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M. flexor carpi radialis brevis (Wood, *Journal of Anatomy*, Vol. I, p. 44):—The muscle arose from the outer border of the radius for 2 inches above the insertion of the *M. pronator quadratus*, and was inserted into the upper border of the anterior annular ligament.

M. sterno-scapularis (Wood, *Proc. Roy. Soc., Lond.*, 1864).—This abnormal muscle replaced the subclavius on both sides of the body in two subjects. In each case it possessed an origin identical with that of the subclavius. It was attached in each case to the upper border of the scapula. In one case, in addition, into the base of the coracoid process, and in another into the fascia over the *M. supraspinatus*.

In another subject a well-developed sterno-scapular muscle co-existed with a normal subclavius (*Præ-clavicularis medialis* of Gruber).

In another subject the insertion of the *M. subclavius* was prolonged to the coracoid from the clavicle.

M. sterno-clavicularis (Hyrtl), *s. supra-clavicularis* (Macalister).—This muscle was found in two subjects beneath the clavicular origin of the pectoralis major, but in front of the costo-coracoid sheath. It took origin from the presternum along with fibres of the pectoralis major, and was inserted into the inner third of the under surface of the clavicle. It was supplied in each case from the external anterior thoracic nerve. (The muscle was found by Hyrtl in six cases out of eighty-three, and by Wenzel Gruber in 5 per cent.) Wood regards it as segmented from the pectoralis minor, but the nerve supply, ascertained as above, points to its affinity to the pectoralis major.

A muscle, which at first sight resembles that form of "coraco-capsularis," noted by Macalister* as No. 2, and regarded by him as simply a form of coraco-brachialis brevis, was found as a small slip arising from the lesser tuberosity of the humerus and the capsule of the shoulder-joint. It passed downwards and backwards under cover of the coraco-brachialis to the upper border of the tendon of the latissimus dorsi, on the anterior surface of which its fibres were lost in a delicate aponeurosis. Its nerve supply, however, from a long delicate branch of the posterior cord of the plexus, goes far to negative the idea of its homology to a coraco-brachialis brevis, and to relate it rather to the *M. subscapularis*.

A more probable example of a coraco-capsularis was present as a considerable slip arising from the fascia of the *M. subscapularis* near the base of the coracoid process. It descended over the ventral aspect of the latter muscle near to its humeral attachment, and was inserted into the fascia over the coraco-brachialis muscle.

* *Trans. Royal Irish Acad.* vol. xxv. Catalogue of Muscular Anomalies.

M. biceps flexor cubiti.—On both sides of one subject, there co-existed with the ordinary coracoid or short head,

- (a) An "outer" head, arising close to and continuous with the insertion of the deltoid muscle.
- (b) An "inner" head, arising from the inner aspect of the humerus, just anterior to the insertion of the coraco-brachialis, and between it and the origin of the brachialis anticus.
- (c) A fourth head, representing the otherwise absent long head, and arising from the bicipital groove (which as such was hardly existent). This head consisted merely of a few tendinous fibres extending upwards as far as the surgical neck of the humerus.

Instances of each of these anomalous features are of course common enough, but it is rarer to find them all co-existent and on both sides of a body.

M. triceps extensor cubiti.—The outer head of this muscle had, in one case, an additional slip of origin, fleshy below and tendinous above, from the tendons of insertion of the teres minor and infraspinatus muscles, and from the capsule of the shoulder-joint. The posterior circumflex artery bifurcated, and one of its divisions passed backwards between this slip of origin and the neck of the humerus.

M. flexor longus pollicis.—In one subject this muscle possessed a very anomalous arrangement. It arose as usual from the shaft of the radius, the interosseous membrane, and the inner border of the coronoid process of the ulna. It ended in a thick tendon which was inserted, partly and chiefly, into the anterior annular ligament. Part of the tendon was, however, continued into the tendinous origin of a small fleshy belly, arising from the annular ligament, and inserted by fleshy fibres into the radial side of the tendon of the *M. flexor sublimis digitorum*, going to the index finger. The junction occurred opposite the neck of the metacarpal bone of the index finger. There was no connection whatever with the thumb, and the *M. flexor sublimis digitorum* was otherwise normal. The thumb received a tendon, which was continued from a muscular slip of the *M. flexor profundus digitorum*, and which was largely inseparable from it. The fibres of this slip arose partly from the anterior surface of the ulna as high as the neck, and partly from the adjacent part of the interosseous membrane, but not at all from the radial side of the latter, which was occupied by the *apparent flexor longus pollicis*. The anterior interosseous artery was between the actual and the *apparent Mm. flexores longi*.

In another subject, a fusiform muscular slip arose from the oblique line of the radius, beneath the flexor sublimis digitorum, and upon the flexor longus pollicis, and was inserted into the anterior annular ligament; while in yet another case the flexor longus pollicis itself gave off a slender tendon to be inserted into the synovial membrane beneath the anterior annular ligament.

I have found no record of conditions similar to those existing in the first of these three cases.

Nerve to the first Lumbrical Muscle in the Hand.—In three hands a double path for the nerve-supply of the first lumbrical muscle was observed in the shape of a communication between the normal branch from the median nerve, which perforated the muscle, and a branch of the deep ulnar, which emerged from the substance of the *M. abductor indicis*. From this ansa branches were distributed to the metacarpo-phalangeal joint of

the index finger. The condition just noted is practically identical with that described by the author in a paper in the *Journal of Anatomy* for October, 1889, on "Variations in the nerve-supply of the first lumbrical muscle in the hand."

M. pterygo-spinosus.—An example of this occasional muscle was associated with the presence of a lesser inferior dental branch of the mandibular division of the fifth cranial nerve, and it separated the latter from the inferior dental nerve proper, which was more internal.

M. scalenus anticus.—A flat ribbon-like band took origin as a part of the scalenus medius, and descended at first behind the anterior primary division of the fifth and sixth cervical nerves. The slip then turned forward between the sixth and seventh nerves, and passed down in front of the plexus, to be inserted along with the rest of the scalenus anticus.

M. mento-hyoideus.—Two cases of this occasional muscle were observed. Each was supplied by the mylohyoid nerve.

M. adductor magnus.—In an aboriginal subject the "round tendon" was continued into the internal lateral ligament of the knee-joint, as in the foetal condition.

Nerve-supply of M. flexor brevis hallucis.—In one foot the outer or fibular head of this muscle was observed to have an additional nerve-supply from a branch of the external plantar nerve, which pierced the adductor obliquus hallucis in order to reach it. St. John Brooks remarks (*Journal of Anatomy* XXI., p. 575), "In no case [out of twenty-five feet examined] did I find the deep external plantar supplying the outer or fibular head of the flexor brevis hallucis, though this is said to be the normal arrangement by Henle (*Nervenlehre*, 1879, p. 593), and by Schwalbe (*Neurologie*, 1881, p. 977)."

M. flexor accessorius longus digitorum pedis.—The presence of this muscle constitutes a not uncommon variety. In one of the cases in which I observed it, it was characterised by the possession of four distinct fleshy slips of origin. The muscle seemed to consist essentially of a small conical muscular belly ending in a slender rounded tendon, which entered the foot. The muscular fibres arose from the deep aspect of the deep septum formed by the aponeurosis of the back of the leg, about three and a half inches above the level of the internal malleolus. The other three muscular slips were united to the resulting tendon of the former, the uppermost having a similar origin to it and being nearly parallel to it at its junction with the tendon. Another took origin from the fascia, and joined the tendon about an inch lower down, while the fourth fleshy slip was more flattened, and was comparatively longer and wider, arising from the posterior surface of the fibula from a point just below the attachment of the flexor longus hallucis to within 2 inches of the level of the tip of the external malleolus, and from the intermuscular septum between the latter muscle and the peroneus brevis. This latter slip joined the common tendon at a much wider angle than the others, crossing the leg obliquely from without inwards. The slender tendon of insertion was directed downwards, directly upon the tendon of the flexor longus hallucis and beneath the internal annular ligament into the sole of foot, where it was found to divide into small slips, of which the least considerable joined that offset of the tendon of the flexor longus digitorum, which united with the tendon of the flexor longus hallucis, while the others were distributed partly to the outer border and deep surface of the flexor accessorius and in part united with a special slip of the tendon of the flexor longus hallucis, also passing to the accessorius.

Cervical Rib (Bilateral).

At an autopsy at the Prince Alfred Hospital, a considerable time ago, I found the transverse ridge corresponding to the junction of the presternum with mesosternum unusually prominent. Joining the lateral margin of the presternum above this level, and about the middle of its border, was a costal cartilage, which appeared to be too low down for a first rib, and, in fact, another was found to be interpolated between it and the clavicle. On further examination this highest costal cartilage was found to end about $1\frac{1}{4}$ inch external to its sternal attachment in an ossified irregular extremity, from which a fibrous band led back for about $1\frac{1}{2}$ inch to become continuous with the sharp tip of a vertebral rib forming the uppermost of the series. A careful examination from below up proved this to be the first of a series of twelve only, although it was plainly a cervical costal arch. The true first thoracic costal arch much resembled a normal second rib in shape and size, except at the sternum, where its synchondrosis was of the normal character. Unfortunately the autopsy was rigidly limited, both as to extent and as to time, and it was impracticable either to carry the dissection on or to spend time in examining the condition. I was thus unable actually to verify either the cervical attachment of the highest costal arch or any of its other relations, or the *entire* absence of any rudiment of a twelfth thoracic rib. But the true second thoracic rib was a reliable land-mark and, further, the (actual) eighth costal arches joined the sternum at junction of meso- and metasternum, after the manner of the seventh thoracic costal arches. Wenzel Gruber, and Turner have given full accounts of the occurrence of cervical ribs. The special interest in this case is its apparent co-existence with absence of the twelfth thoracic arch. The condition was bilateral.

Notes on the Function of the Thyroid Gland, with Observations on a Case of Thyroid Grafting.

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MY work in writing the following notes on the function of the thyroid has been made comparatively easy by Victor Horsley's latest paper.* This, while furnishing me with an account of recent work on the subject, which otherwise in Brisbane it would have been impossible to obtain, has also made it unnecessary for me to even refer to the work of others except where necessary for the special elucidation of any point. My paper, therefore, will have the advantage or disadvantage of being based upon observations of my own on the function of the thyroid, and will have the special purpose of recording the case of a child in whom I believed the thyroid to be at least functionally absent, and into whose body I have twice grafted the thyroid of a lamb—first, under the skin of the chest, and afterwards into the abdominal cavity.

To Victor Horsley's paper I shall have to refer, as I cannot agree with some of his conclusions regarding the function of the thyroid. I had occasion to correct in the *British Medical Journal*† his misquotation of my work in an early part of his paper. This correction,‡ though made with suitable diffidence, has given offence to Mr. Horsley, and has been resented by him.

In a paper§ on the blood-forming organs, published in 1885–1886, I recorded observations on dogs, directed to ascertain whether or not the thyroid gland had, as regards corpuscular elements, any blood-forming properties. From these I felt justified in concluding that it possesses no blood-forming properties. And I was at the same time able to disprove its alleged function as compensatory to the spleen. Both of these functions I note that Victor Horsley is still inclined to support, and has for that purpose included in his paper evidence from Crede and Zexas, whose work I showed to be unreliable in this matter. Stephen Mackenzie, in an exhaustive paper on "Pernicious Anæmia,"|| read before the Medical Society of London, states, "It has recently been suggested that the thyroid body if not in ordinary circumstances a blood-forming organ may take on this function when all the latent capacity of blood-formation is called into play. The evidence on which this opinion is based has been shown by Gibson to be very meagre and inexact, and it may be accepted that the thyroid body has no hæmopoietic function."

Surely we can ascribe no blood-forming function to a gland whose excision is followed by no reduction in the number of coloured cells in the blood, and by no important alteration in the number of colourless cells. In two of my dogs such was the case in spite of the fact that the effect of the excision

* *British Medical Journal*, Jan. 30th, Feb. 6th, 1892.

† *British Medical Journal*, May 14th, 1892.

‡ *British Medical Journal*, May 21st, 1892.

§ *Journal of Anatomy and Physiology*, vol. xx, part iv.

|| *British Medical Journal*, Dec. 10th, 1890.

was lethal, and of the additional fact that one was also minus its spleen. In a third dog, which showed reduction in the number of hæmocytes, this could be ascribed to voluntary starvation preventing, by its depressing influence upon the blood-forming organs, a recovery from the initial reduction of corpuscles due to the operation. I do not deny, in fact assert, that if animals live long enough after excision of the thyroid they become anæmic, but this can be ascribed to the very serious effect that the absence of the thyroid has upon the nervous system, and upon the general body metabolism, exercising a depressing influence on blood formation. And surely the case of a dog whose spleen was excised with a resulting slight reduction in the number of red cells which seemed to reach a maximum, as in other dogs, at about two months after the excision, is sufficient to disprove any compensatory function of the two glands as well as any blood-forming function of the thyroid. For, from this dog, I subsequently removed first one lobe of the thyroid without any ill effect on the animal, and without its absence having prevented the red corpuscles from reaching within a month, the number which had existed in the blood previous to the excision of the spleen, *i.e.*, the hæmocytes increased in numbers during the month subsequent to the excision of the first thyroid lobe, in spite of the fact that the animal was also without a spleen. The remaining lobe of the thyroid was then removed with a lethal effect, fourteen days after, but with so slight an effect upon the number of the coloured corpuscles that two days before its death they were equal in number to those in the blood previous to the excision of the first lobe. This animal also, be it noted, lived without spleen and thyroid practically as long as the other two dogs from which the thyroid alone had been excised at one operation.

Victor Horsley has objected to the results of enumeration, in the cases of these three dogs, that they are negative and, therefore, of no value, as compared to the many which he calls positive results, where reductions in the number of hæmocytes have been noted subsequent to excision. To this I have to remark that my results have really the value of *positive* evidence, while the cases which showed reduction could only have the value of negative evidence. Dogs suffer so quickly and acutely as the result of complete excision, that it is a matter of surprise that the blood shows so little reduction in the number of red cells even as an effect secondary to the nervous and general symptoms. To his hint that my enumerations were faulty, I have to say that my previous experience in enumerating the blood corpuscles as resident physician to Prof. T. R. Fraser, and the precaution I took to doubly dilute every specimen in order to eliminate faulty enumeration as a result of too many corpuscles being in one field, makes it unlikely that my results are unreliable. My views, also, regarding breaking down coloured corpuscles prevented me from counting any but natural ones.

Victor Horsley after, indeed, saying that he sees much to support the blood-forming action of the thyroid says, "There is no evidence that the thyroid gland is directly hæmopoietic as regards the red corpuscles, &c.;" but, he says, Kohlransch has "found that in the acini are bodies closely resembling blood-plates." I can, myself, confirm these observations of Kohlransch, for I have frequently remarked the number of bodies in specimens of teased thyroid gland, similar to the variety of blood-platelets called by me coloured microcytes.

According to Horsley, "The changes in the blood apart from alteration in the number of corpuscles are as follows:—(a) Increased vascosity (all observers, especially Herzon, Hofrichter, and Rogowitsch); (b) Great

diminution in the amount of oxygen (Albortoni and Tizzoni) which may, in the arterial blood, fall below the normal proportion in the veins; (c) Presence of abnormal constituents of the Plasma.—Halliburton has found mucin in the blood of monkeys in which I (Horsley) had performed thyroidectomy." He further remarks, "It requires no insistence to point out that such changes in the blood, gravely altering its constitution and functional activity, must evoke a considerable degree of anæmia, both by distinctive changes in the fluid itself, and by the effect which it, thus altered, necessarily exerts in the blood-forming tissues, for example, marrow."

Might we not go a step further and conclude that the changes in the blood, observed by Herzen, Hofrichter, Rogowitsch, and Albortoni, and given such prominence by Horsley, as primary results of thyroidectomy, may, themselves, be secondary to the effect on the general nutrition due to the absence of some material secreted by the gland, and necessary to life or for the proper working of the central nervous system?

My few observations alone, made as they were on dogs which die so soon when deprived of the whole thyroid, are sufficient to prove that the gland has no important function as regards the corpuscular elements of the blood, as these remain practically unaffected after thyroidectomy, even after the onset of acute nervous symptoms threatening life and resulting in death.

Whether the thyroid secretes a substance which alters the chemical composition of the blood plasma is quite another affair. And in my original paper I gave adherence to the hypothesis, advanced by Schiff, that the gland secretes some substance whose absorption into the blood is essential to life. And to the extension of this hypothesis, by Sanguinetti and Canalis, that the gland secretes some material which is necessary for the nourishment of the central nervous system. And I made the following remark, "Against the no doubt pretty strong arguments brought forward by Horsley, in favour of an excretory function of the thyroid, I may here refer to the apparent success of Schiff in securing dogs against a fatal result of excision of the gland by placing the freshly excised thyroid of another dog in the abdominal cavity some weeks before the operation," and, further, "to suppose that the injurious substance is taken up by the lymphatics would involve the improbable-looking further supposition of a passage from those back again into the blood with a subsequent re-excretion by some other organ." Extending this objection further, I may now say that unless the lungs proved to be the organs by which this injurious substance (supposed to be excreted by the thyroid) was ultimately excreted, it would be distributed, after passing through these both, throughout the systemic and cerebral circulation. Not certainly provident nature's method of dealing with poisonous substances.

Horsley, himself, records a very strong point against this excreting hypothesis, viz.:—the experiments of Vassale on nine dogs. The juice and secretion were expressed from the excised glands, and injected into the animals, the cachexia being thereby considerably diminished. And he further mentions the striking results of Dr. G. Murray* in treating myxœdema by this method. But he, nevertheless, concludes that the thyroid gland is a structure essentially connected with the metabolism of the blood and tissues; and in fulfilment of its functions it is hæmopoietic, both directly and indirectly, and that it forms, that is, secretes from the blood a colloidal substance which is transmitted *via* the lymphatics from the acini of the gland to the circulation."

* *British Medical Journal*, 10th October, 1891.

But, to put his conclusions more distinctly forward, and without going beyond the limits of this paper, I may say that, of the ten hypotheses recorded by him as advanced regarding the functions of the gland he gives adherence to three, viz. :—

1. "That it is directly a blood-forming organ."
2. "That it is indirectly a blood-forming organ."
3. "That it modifies or destroys substances which, circulating in the blood, are harmful to the general economy." This he considers its most important functions, and he adds to it a, to my mind, still more important corollary, viz. :—That it secretes some substance useful to the general metabolism of the body.

This corollary, which is simply Schiff's hypothesis above mentioned, seems to me somewhat strange after what Horsley says of the hypothesis, that it manufactures some substance specially necessary to the integrity and proper functional activity of the central nervous system, which, he concludes, "is not strongly supported." "The fact," he says, "that the nervous system suffers so prominently in the cachexia thyroidectomica is no proof in favour of this restricted creed of the functions of the gland ; it is only one expression of the general disturbance of metabolism caused by loss of the thyroid tissue."

There seems to me much to be said in favour of the general metabolism suffering secondary to the nervous system, and of influence so exerted being in higher vertebrates, at least, the most direct and least restricted method of influencing general tissue metabolism.

Mr. Horsley's paper is altogether so complete, and he brings such a train of evidence of his own and of other observers in support of Schiff's hypothesis that the thyroid secretes and not excretes, that it seems a pity for him to continue to support, even half-heartedly, a conclusion against which he himself has brought so much evidence. This part of my paper cannot be closed without referring to Mr. Horsley's accusation, in his reply to my letter, that I borrowed, in my original paper, and without acknowledgment, a conclusion of his. This is incorrect, as my conclusion could not have been borrowed from the report of his lecture on account of its non-existence there.

The conclusion referred to ran as follows :—* "That any blood-forming action it (the thyroid) may in some animals seem to have is due only to the presence of lymph follicle tissue in the thyroids of such animals." By lymph follicle tissue I understand and mean tissue identical with lymphatic gland structure. Such tissue is found in almost every gland and scattered generally throughout most parts of the body, being a very constant element in mucous membranes. To think it possible, therefore, that some may be present in the thyroid gland without being part of its essential structure is nothing original, and would in no way justify the gland being reckoned among the blood-forming ones. Otherwise we should be still more justified in enumerating amongst such glands, the lungs and the pancreas.

Mr. Horsley's conclusion, which I am accused of borrowing, ran as follows :—† "The thyroid gland appears to consist of two different portions—(a) glandular, having the function of excreting mucin (?); (b) highly vascular lymphoid nodules having a (?) hæmatogenous function." The most important practical conclusion in my paper, as in those of others, was that total excision of the thyroid is an unjustifiable operation, as proved by Kocher,

* *Op. cit.*

† *Lancet.* December, 27th, 1884

Reverdin, and Brunns on the human subject, and by Schiff and many others on animals. Whether exception might be made to this conclusion in the case of malignant disease, including both lobes, I should not like to say. It is possible that under such circumstances the patient might be given the chance of possessing an accessory thyroid, or of subsequent treatment by thyroid-grafting or by injections.

The patient whose case I would bring under your notice to-day, was first seen by me in the out-patient department of the Brisbane Hospital for Sick Children when 2 years of age, and was then diagnosed to be a case of myxœdema. From this photograph you will see some, though, perhaps, no very great justification for the diagnosis. The only alternative seemed to be subacute Bright's disease, which was put out of the question by examination of the urine. The child was under observation for a short time, and was then lost sight of. Its chief symptoms were the usual thickening of subcutaneous and submucous tissue, and great solidity. He came again under my notice when 4 years of age, as an in-patient of the Children's Hospital, and in a much more advanced stage of the disease. The myxœdematous swelling was very marked, and in the prepuce, testicles, and eyelids had superadded to it some considerable less solid œdema. He resembled, very markedly, a case of acute Bright's, but again there was nothing in the urine to support this. These photographs will give you a fair idea of his then condition. He suffered from a fairly severe attack of bronchitis while in the hospital, but recovered from that, and seemed to improve somewhat under pilocarpine, at least the less solid œdema disappeared. During his stay in hospital, the child lay like a log, and took notice of nothing or of no one, unless specially called to do so, and there was great difficulty in calling his attention. In other words, he crebrated very little and that little with extreme slowness. On the very evening his case was to be exhibited by me at our medical society I was taken seriously ill, and this illness led to my losing sight of the child for other two years. By then making inquiry I was able to find him for the purpose of trying the effect of thyroid-grafting. The photograph I show you now of his appearance at 6 years of age would enable any medical man to diagnose him as a case of myxœdema, myxœdema of course including his being a sporadic cretin.

It seems to me that cretinism myxœdema, and cachexia strumaprima are all closely related, and that their individual symptoms differ only in being due to the functional absence of the thyroid gland affecting through the nervous system, more or less markedly, this or that part of the connective tissue. This child is no doubt a sporadic cretin, while it might be the latter without suffering from myxœdema. Virchow reminds us, according to Horsley, of the two forms in these words:—"First, as we should now say, the myxœdematous form, and second, the atrophic form," pointing out that "in the former case the resemblance between the so-called congenital variety of the disease, and that developed in adult life is so marked as to lead us to believe they are identical in origin." The photographs taken at 2, 4, and 6 years, will prove to you that the condition of the child was advancing for the worse, and will enable you to allow that subsequent improvement must have been due, therefore, to treatment. He has had no treatment but thyroid grafting, and these photographs, mostly taken very kindly for me by my colleague, Dr. Peter Baneroff, will show you its effect.

Transplantation was done by Schiff about 1883, and according to Horsley, as early as 1883 by Kocher, in cachexia strumaprima, later by Bireher and Horsley, and has been performed in France by several surgeons in cases of

myxœdema and sporadic cretins. "The sum of these operations being unquestionably an improvement in the patients and amelioration of the symptoms in those cases where the grafted gland survived." (Horsley.) My patient at the age of 6 years was admitted for thyroid-grafting on July 2nd, 1891. The two photographs in the third row of the series were taken in the middle of July. He had the usual appearance of a myxœdematous sporadic cretin, or more strictly of a myxœdematous child. Description is unnecessary on account of the photographs. Condition:—Cannot stand without being well supported; has to be fed on slop food, on account of his difficulty in swallowing anything hard; appetite is fair; habits cleanly; respiration becomes difficult towards evening, when he makes a crowing sound, and often seems to be choking. His breathing when asleep is always noisy, and quite frightens the other children. He is heavy, stolid, and unnoticing all day—somewhat less so towards evening. Skin is tense and glazed, at parts rough, dry, and hard to the touch. Extremities cold to the touch, and often quite livid. July 20th, 1891: Anæsthetised the child and a lamb in the same room. Removed both lobes of the lamb's thyroid and introduced them directly within the sheath of the great pectoral in the right mammary region, just below the nipple. Each lobe was laid open by a longitudinal incision previous to insertion. The subsequent history of the lamb will be given later. The boy's wound did not heal by first intention, but discharged slightly. It was firmly healed in a month. Nothing like portions of broken down thyroid were discharged. The inserted glands have never been capable of detection through the skin. Improvement in mental state was noticed upon even the day subsequent to the operation.* July 29th: Nine days after grafting, noted that he was much brighter looking, and that he was laughing and taking more interest in his surroundings. July 31st: Œdema noted to be much less, feet and hands to be warm, that the skin had lost its glazed appearance and was becoming soft. August 2nd: Mother considers him thinner than he has ever been. August 5th: Quite bright looking, sucking his fingers, and making sounds as if trying to talk. August 23rd: Photographs of fourth row taken by Dr. P. Bancroft. Wound quite healed. Skin soft and natural looking, and to the feel. October 6th: Height, 31 inches. Photograph in fifth row taken by Dr. P. Bancroft. November 12th: The following noted:—Patient has been steadily improving, all œdema has disappeared, though lips, hands, and feet are still rather thick. Skin is perfectly natural to look and feel, soft, and almost moist like a healthy baby's. He sleeps quite quietly, and has discontinued to make the crowing sound and choking noise at night.† Seems very happy, and takes interest in what goes on in the ward. Likes looking at pictures. Shakes hands readily, and can walk with very little support, but tendency to become bow-legged. Is stubborn for his own way, and cries loudly if thwarted. He laughs and crawls along the floor after the other children and the nurses, and knows his way well to the dining-room. Does not require to be confined to slop food, and feeds himself like a child of about 2 years. Has a distinct preference for a little girl suffering from hip-joint disease, and takes things to show her, making sounds while doing so, as if trying to talk. In February, 1892, it was noted that he can be sent a message by the other children or by the nurses, and seems to understand for what he is sent, and to be increasing in intelligence. In March his height was $31\frac{1}{2}$ inches, or a gain of $\frac{1}{2}$ an inch. He would, then, not try to walk alone, but support from a single finger was sufficient. There had, however, been

* Which supports observations of Dr. Murray and of Dr. Macpherson (*Edinburgh Medical Journal*, May, 1892), and the opinion that only absorption of the juice of the inserted gland could have caused so early an effect.

† Owing to the disappearance of submucous œdema.

no perceptible improvement between October, 1891, and May, 1892; in fact, the skin began to show a tendency to become dry again, though without any sign of returning oedema. In this month the photograph in the sixth row was taken preparatory to further grafting. Note that it is to all appearance the photograph of a baby boy, not certainly of 6 or 7, but say of 2 years.

May 20th: A second lamb was etherised. Lobes of its thyroid introduced into child's abdomen, each being first incised as previously. One lobe was attached by silkworm gut stitch to anterior left abdominal wall, the other placed free in the right side of the abdominal cavity. The incision was made in the linea alba, no vessels required tying. Silkworm gut and horse-hair sutures were used. Wound healed by first intention. The anterior abdominal wall was noticed during operation to be very thin. The lamb was unfortunately killed by ether.

No symptoms of peritoneal irritation, and no abdominal distension occurred after introduction of the glands. At that time, however, several children in the wards suffered from dysenteric diarrhoea—Johnny had a rather severe attack, commencing four days after the operation, and lasting for three weeks. During it his temperature ranged between 98 degrees and 102 degrees. This dysentery reduced him considerably, and has somewhat complicated his progress; but since the end of June he has been improving. The attack may, of course, have been due to peritoneal irritation, but there were no signs of such, and not the least tenderness.* The gland attached to the anterior abdominal wall could be felt with great clearness for more than two months; latterly it is less distinct, but recognisable. The unattached gland could also be clearly felt for some weeks, only a faint indication of its presence can now be detected. The last photograph, taken September 4th, will show you his present condition. To all appearance he is now merely a well-nourished baby boy, with soft natural skin and firm limbs, with somewhat thick features and lips, but no myxœdematous swelling. The fatty lumps in the lower cervical region have almost disappeared, and he is now taking an increased interest in what goes on in the ward; he plays with tops and pictures much as a child of between 2 or 3 years would do. He stands and walks pretty firmly, though still afraid to do so without support, which, however, requires to be little more than nominal. He is easily amused, and laughs and smiles in quite an intelligent manner. The grafting, to sum up shortly, has cured his myxœdema and has lessened his cretinism. Whether it and, if necessary, future grafting will succeed, further remains to be seen. His height is now $32\frac{3}{4}$ inches, *i.e.*, he has gained nearly 2 inches, certainly, in the last year. Without the photographs his case would be of little interest, and you would only have my word for his improvement. The camera, however, cannot lie, and by its aid I hope to have succeeded in interesting you.

HISTORY OF FIRST LAMB.

Its wound healed with practically no suppuration. It showed no symptoms whatever as the result of the removal of its thyroid. It was allowed to live until February 10th, *i.e.*, for seven months. I made up my mind that it possessed an accessory thyroid. It was killed, and a careful *post-mortem* made, but no accessory thyroid found. The region of the trachea was then thoroughly explored, and a piece of thyroid gland was found in front of the trachea, and between it and the cicatrix of about the size of one of the kernels of a broad bean. This, no doubt, was a hypertrophied small piece of gland

* It may also have been due to an overdose of thyroid juice.

which had been accidentally left at the operation. The thyroid of a sheep consists of two lobes without a definite isthmus. These lobes are long and very spindle-shaped, and situated at the side of and almost behind the larynx and upper end of the trachea. Doubtless, in ligaturing their vessels preparatory to excising them a small piece of the *very thin* lower end of each had been left on the proximal side of the ligature. These had been approximated and drawn forward in the cicatrix, and had hypertrophied to carry on the essential function of the gland. May not this explain the absence of cachexia in three lambs observed by Sanquirco and Orrechia after the removal of their thyroid glands? I can hardly believe so short-lived an animal as a sheep would fail to show cachexia within seven months, and it is fair to conclude that the piece of thyroid found in the case of my lamb was sufficient. I can be sure that no piece so large was left, as I considered that the whole gland had been removed. It was therefore an hypertrophied piece. Special care was taken to excise both lobes very completely from my second lamb, but unfortunately, as said before, it inhaled an overdose of ether while our attention was being given to the boy. It occurred to me that this hypertrophy of what had been left behind when removing the thyroid glands from the lamb would be able to furnish evidence either for or against the alleged blood-forming function of the thyroid. After hardening I cut quite two-thirds or the whole of it into sections by the aid of the freezing microtome, and carefully examined all the sections, about 200, for lymph follicular nodules. The great majority of the sections contained no lymph follicular nodules and those that did contain any, contained so little as to leave no doubt that they were not an essential part of the gland structure. I had the curiosity to make a rough estimation of the amount found in the section which contained most lymph follicular tissue. This section measured half an inch by nearly a quarter of an inch, it showed two lymph follicular nodules which, after being recognised as such by the microscope, proved to be just large enough to be distinguished by the naked eye in an unstained specimen as of different tissue, because of different colour to the thyroid gland structure. The lymph follicular tissue in those sections which contained any was almost always either connected with some prolongation inwards of the capsule or with some moderately sized blood-vessel. The cells lining the gland acini were noted to be cubical in shape and to have the appearance of being young cells.

It will surely be readily acknowledged that if lymph follicular nodules had been an essential part of the thyroid gland structure they would have been very numerous in a small piece which had hypertrophied to carry on the essential function of the gland and had done so satisfactorily.

No. 1.



1887.

When first seen, and first diagnosed to be a case of Myxœdema. Aged 2 years.

No. 2.



1889

Myxœdema much more pronounced. Aged 4 years.

No. 3.



1891 (July).

Showing that disease had steadily advanced. Admitted for Thyroid grafting. Aged 6 years.

No. 4.



1891 (August).

One month after grafting of first Thyroid.

No. 5.



1891 (October).

Three months after grafting of first
Thyroid.

No. 6.



May (1892).

Ten months after grafting of first
Thyroid. Just previous to grafting
of second Thyroid.

No. 7.



1892 (September).

Four months after grafting of *second* Thyroid
(into peritoneal cavity.) Contrast this
specially with No. 3.

The Effect of Food on the Secretion of Bile in Man.

C. J. MARTIN, M.B., B.Sc. Lond.

Demonstrator of Physiology in the University of Sydney, late Demonstrator of Physiology in King's Coll., London—with an analysis of human bile, by E. F. HERROUN, F.I.C., F.C.S., formerly Senior Demonstrator of Physiology, King's Coll., Lond.*

THE subject of the following investigation was a woman aged 26, in whom a biliary fistula was surgically established, owing to the common bile duct having been completely blocked by the presence of a large calculus. (At the time of the operation the cause of the obstruction was not discovered.) As a consequence, the whole of the bile was discharged through the opening in the abdominal wall. After the operation the patient rapidly increased in weight, gaining in one week as much as 5 lb. The stools were white from undigested fat, and not particularly offensive. During the whole time she was never troubled with constipation. She had a good colour, a splendid appetite, and notwithstanding the annoyance of a fistula, expressed herself as feeling well. Such a condition of affairs presented remarkable opportunities for investigating the bile-flow, and variations in this flow due to food, drugs, &c. My observations were unfortunately not completed, for owing to the untimely intervention of surgical aid, the patient died. For the opportunity of investigating this case I am indebted to the kindness of Dr. Bristowe, F.R.S., under whose charge the patient was. I am also beholden to my friends, Dr. E. Hobhouse, at that time House-physician at St. Thomas' Hospital, and "Sister Charity," both of whom afforded me every assistance in their power.

The number of cases of biliary fistula in man which have been investigated is not great, and this case is in marked contrast to most others, as the patient may reasonably be considered as a normal individual, whereas previous cases have usually been suffering either from malignant disease,† or hydatid cyst of the liver, as in Ranke's‡ case in which the bile was discharged through the air passages.

V. Wittich§, Yeo and Herroun§, and Noël Paton and Balfour|| have failed to discover in the human subject any rise in the secretion of bile after meals, which negative results are in contrast to the well-known observations on animals, of Schmidt,¶ Köl liker and Müller,** Hoppe-Seyler†† and Wolf‡‡ who record a very marked increase in secretion occurring two to seven hours after the ingestion of food.

The object of the experiments, the results of which are embodied in this paper, was to determine whether the failure of previous investigators to

* Observations on the bile from the same case were made, of which at the time I was ignorant, by Drs. Copeman and Winston; the results of which were published in the *Journal of Physiol.*, vol. x, No. 4. Where our observations coincide, I have merely mentioned the fact, and have not considered it necessary to describe details. A further analysis by so able a chemist as Prof. Herroun can but be a welcome addition to the literature of Chemical Physiology.

† V. Wittich, "Arch., f. d. gesamt. Physiol." Yeo & Herroun, *Journal of Physiol.*, Vol.

‡ Ranke "Die Blutvertheilung und der Thätigkeits-wechsel der Organe," Leipzig, 1871.

§ *Loc. cit.*

|| Lab. Reports, Roy. Coll. Physicians, Ed., 1891.

¶ Bidder & Schmidt, "Die Verdauungs-Säfte und der Stoffwechsel."

** Köl liker & Müller "Würzburger Verhandlungen," 1885 u. 1886.

†† Hoppe-Seyler, "Physiol. Chemie," S. 308.

‡‡ Wolf—Allgemeine Med. Central Zeitung für 1869, S. 87

obtain evidence of increased secretion after a meal, was ascribable to the serious illness of the patient, and the consequently very small amount of food taken, or whether man differed from the lower animals in this respect.

I chose the night-time for my observations for three reasons:—

- (1.) It was necessary to allow a sufficient interval between two meals, in order that the effect due to the first, might have passed off before the second was taken. With five meals a day (which the patient was having) this was the only time when one could obtain such an interval, viz., from supper at 7.30 p.m. until breakfast at 5 a.m.
- (2.) It was advisable to have the ward free from vibrations and students, both of which might very possibly have interfered with the accuracy of my registering apparatus.
- (3.) During the night the patient remained quiet in bed, so that the chances of her kinking the tube, which made communication between the gall bladder and the registering arrangements, were minimised.

The method hitherto adopted to determine the variations in the amount of bile-flow, has been to allow the bile to flow from the fistula, into a measure or bottle, and note the amount every fifteen or thirty minutes. As this would have necessitated my sitting up all night, for some considerable period, I endeavoured to devise a method of obtaining a curve of the bile-flow automatically. My only difficulty was to find a suitable float. After several unsuccessful attempts, I used the following arrangements which proved entirely satisfactory. A piece of glass tube $1\frac{1}{2}$ inch long and of slightly larger diameter than the fistula, was drawn out in the flame so as to produce a constriction in its centre. With a little patience and glycerine, this tube could be gradually insinuated into the opening in the abdominal wall, and when once inserted, was so firmly held by the margins of the wound that not a drop of bile ever escaped by its sides. To the end of the tube a piece of flexible but stout rubber-tubing was fixed, which conducted the bile to a cylinder (A, Plate 1) containing some sol. of phenol, 1 in 20. On the surface of the fluid rested a cork from the centre of which a thread passed up over a light, freely-running pulley, and to the other end of the thread was attached a small weight. The counterpoise (lever and weight) was heavier than the cork, which latter was kept on the surface of the water by surface action. By this little device the cork and weight followed accurately any rise in level of the fluid. The string to the end of which the weight was attached carried a light aluminium lever, the writing point of which was kept against the smoked surface of the drum by a guide. The remainder of the recording apparatus consisted of a light drum covered with smoked paper, fixed on the hour pinion of an eight-day American clock, so that it made one revolution in twelve hours. The clock was tested several times when carrying the cylinder and was never more than two minutes slow at the end of twelve hours. A figure of the recording apparatus is given at the end of this paper.

By these means I obtained curves in which the abscissæ represent time in hours, and the ordinates the amount of bile secreted. The diameter of my glass cylinder was such, that $\frac{1}{2}$ inch rise is the level of the contained fluid represented very closely the discharge of one fluid ounce of bile. Photographs (reduced in size one half) of some of the curves are reproduced at the end of this paper. From these curves the "rate of flow" for finite intervals of time can be easily determined, and thus "speed curves" made. I have drawn a series of these "speed curves" representing the rate of flow between 10.30 p.m. and 10 a.m., and compounded them into a mean curve which is figured at Plate (V). On examining it, one sees that the rate of

secretion is very far from uniform, and that there exist some marked alterations in the speed of flow. At first the speed is moderate, presumably owing to the effect of the previous meal (supper). By 12 o'clock this effect has apparently passed off, and the rate of secretion sinks to a minimum at 4 o'clock. At 4:30, when the patient is awakened and washed, the rate of flow increases. About 2 hours after breakfast, which meal is taken at 5 a.m., the secretion becomes very rapid, and lasting for three hours, reaches a maximum between three and four hours after the ingestion of food, and then diminishes. This marked rise in rapidity of secretion following the taking of food, compares with the results obtained on animals. The rapid increase in secretion occurs about two hours after the entrance of food into the stomach, which is presumably about the time food begins to enter the small intestines.

Nöel Paton and Balfour, in their able paper on the composition and flow, &c., of the human bile, come to the conclusion*: "In man the meals usually taken appear to have no immediate effect on the flow of bile or the amount of solids produced." They found the excretion of bile to be very irregular, and considered it unnecessary to collect it more frequently than every four hours.

Copeman and Winston's curve is so extraordinary, showing a rise after breakfast and a fall after dinner, that I fear I cannot claim support from their observations, although they appear satisfied that their chart demonstrates that the taking of food causes an increase in the rate of bile secretion.†

The three "curves of flow" in Plate 2 show such a marked uniformity that I cannot but feel justified in considering the sequence of events in the light of cause and effect.‡

Analysis of Bile.

	Per cent
Specific gravity, 1,009.	
Mucin and colouring matter	0.43
Sodium chloride.....	0.6805
Calcium and magnesium phosp.....	0.065
Soluble sulphates and phosphates	0.0334
Fats and cholesterin	0.0071
Bile salts (tauro and glyco-chocolate)	0.414
Total solids.....	1.6300

The colour of human bile.

Considering that in two of the standard works on physiology in the English language, namely, Foster's§ "Text-book of Physiology" and the "Handbook for the Physiological Laboratory,"|| not to mention others, it is distinctly stated that the human bile is brown, it may not be out of place here to insert a few remarks on this subject. Human bile from a fistula has been, in all the cases which I have seen, of a dark olive-green colour, and Murchison¶ mentions that this was invariably the case in his experience. Drs. Copeman and Winston** have drawn attention to this fact, and conclude that the brown colour of bile obtained from the gall-bladder in the *post-mortem* room is due to the conversion of the biliverdin to bilirubin under the reducing influence of putrefaction. They were able to demonstrate this on

* *Loc. cit.*, p. 217.

† *Loc. cit.*

‡ NOTE.—This conclusion might easily have been put to the test by altering the breakfast hour to some hours later, had I not, as previously explained, been prematurely deprived of my *versuchsthier*.

§ Fifth edition, page 421.

|| "Lauder Brunton, Handbook for the physiol. lab.," p. 495.

¶ "Dis. of Liver."

** *Jour. of Physiol.*, vol. x, No. 4, p. 219.

monkeys, whose freshly secreted bile is green (biliverdin in excess), but after death it is gradually changed to brown, due to the biliverdin becoming reduced to bilirubin, or even hydro-bilirubin, a process of reduction which can easily be brought about by nascent hydrogen (sodium amalgam) or sulphurous acid. Noël Paton and Balfour, however, state that in their case the fresh bile was brown and became green on exposure (oxidation).

COMPARISON OF THE PERCENTAGE OF SOLIDS IN BILE FROM A FISTULA WITH
THAT FROM THE GALL-BLADDER.

The much larger percentage of solids contained in bile from the gall-bladder of a freshly-killed animal than in that obtained from a fistula has been remarked by Bidder and Schmidt,* Hoppe Seyler,† Copeman and Winston,‡ and Bunge,§ amongst other observers, and the explanation that this is due to absorption of water by the gall-bladder, has found considerable favour. Bunge|| after stating this difference in the amount of solids, says: "It is therefore evident that an absorption of water occurs in the gall-bladder," which statement does not by any means appear evident to me, for if one compares the amount of solids in the two varieties of bile, while the bile, acids, mucus, and pigment, cholesterin and lecithin are present in much smaller quantities in fistula-bile, the inorganic salts are equal in amount in the two cases. This fact is obvious if one compares the analyses of Hoppe Seyler,|| Yeo and Herroun||, Noël Paton and Balfour,|| Copeman and Winston,|| and Herroun in this paper, with those of gall-bladder bile by Frerichs,¶ and Gorup Besanez**. It is also commented on by Halliburton in his text-book for chemical physiology. (Ed. 1. p. 676). If one adopts this explanation, one must assume that in the gall-bladder, water and inorganic salts are absorbed but not bile salts, and as these latter are freely absorbed from the small intestine†† this assumption does not seem warrantable. On the other hand these facts seem to support the view of the so-called circulation of the bile first put forward by Schiff, viz:—That the constituents of the bile are to a large extent reabsorbed from the intestine and conveyed to the liver by the portal vein where they are once more secreted and do service again and again. In this way, although only a small amount of bile-acids be formed the quantity contained in the bile at one time may be considerable. In the case of a fistula, these constituents pass at once out of the body and are hence not available for secretion again. The amount of Na Cl in the intestines during digestion is so considerable that the loss, through the bile passing at once out of the system is insufficient to appreciably affect the amount secreted by the liver.

In conclusion, I have to thank Mr. Robert Grant for taking much trouble in photographing the curves, which are shown in plate 2.

* *Loc. cit.*

† "Physiol. Chem.," 1881.

‡ *Loc. cit.*, p. 221.

§ "Physiol. and Path. Chem.," translated by L. C. Wooldridge, p. 212.

|| *Loc. cit.*

¶ Hannover Arm. Jahrg. V. Heft, 1. 3 Anp. p. 529.

** "Lehrbuch der physiol. chemie.," by Gorup Besanez.

†† Tappenier, "Wiener, Litzungsberichte," lxxvii p. 281. Found bile salts were absorbed by the ileum but not by the duodenum nor jejunum.

DESCRIPTION OF PLATES.

PLATE I :—

Sketch of apparatus employed to record the flow of bile.
(For explanation, see text.)

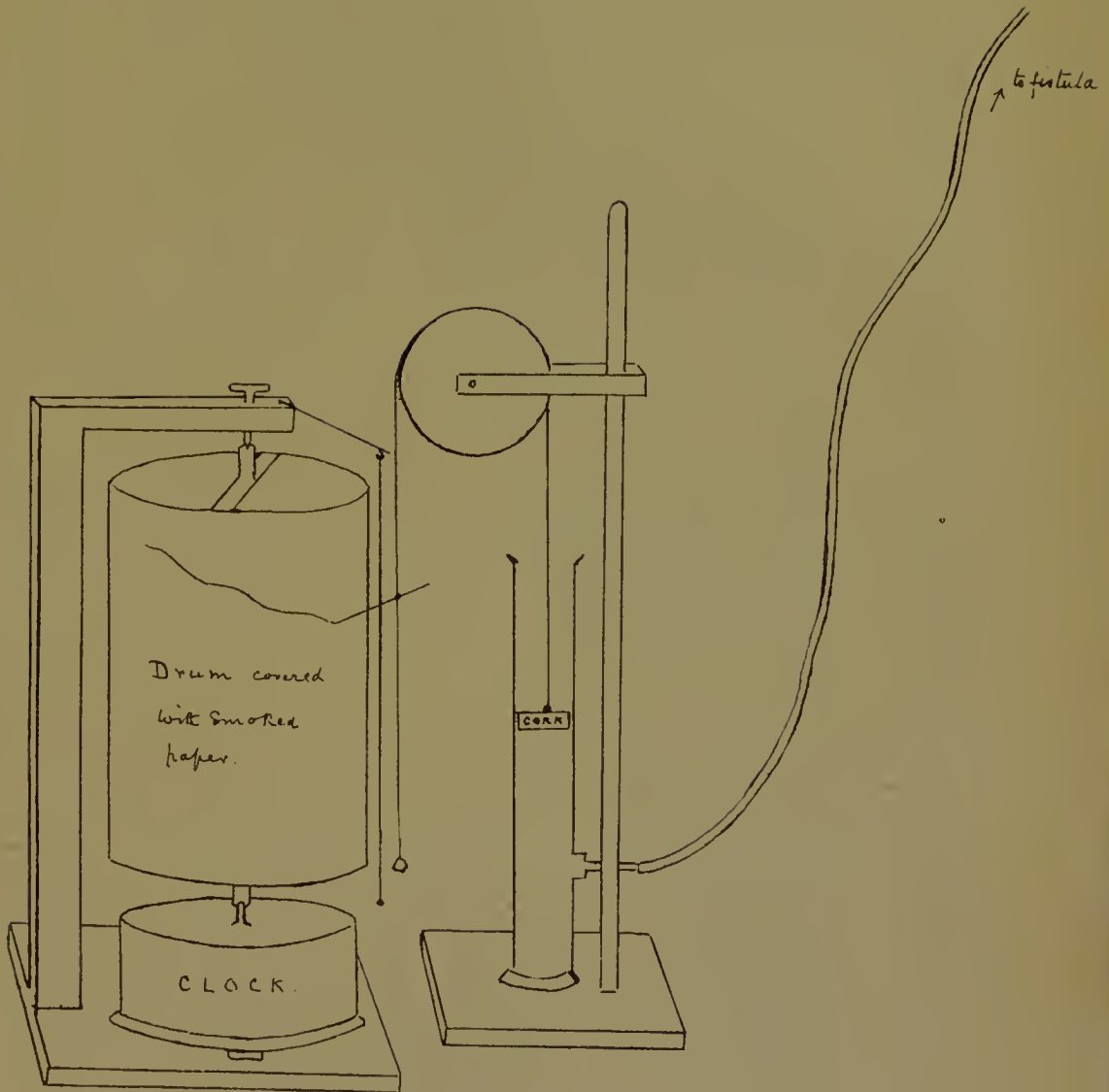
PLATES II, III, AND IV :—

Specimens of tracings obtained with apparatus, and by method described in text. (The photographic reproductions shown in these plates are taken from transparencies obtained from negatives of the actual curves reduced one-half.) The ordinates represent amount of flow, and the abscissa, time. The numbers written at various points along the abscissa indicate the hour of the night; and the divisions along the same line represent periods of fifteen minutes in Plate II, and thirty minutes in Plates III and IV.

PLATE V :—

Curve of *speed* of flow compounded from the previous, and other curves of *amount* of flow. This curve shows the *speed* with which secretion occurred at any time during the period between 10 p.m. and 10 a.m.

Plate I.

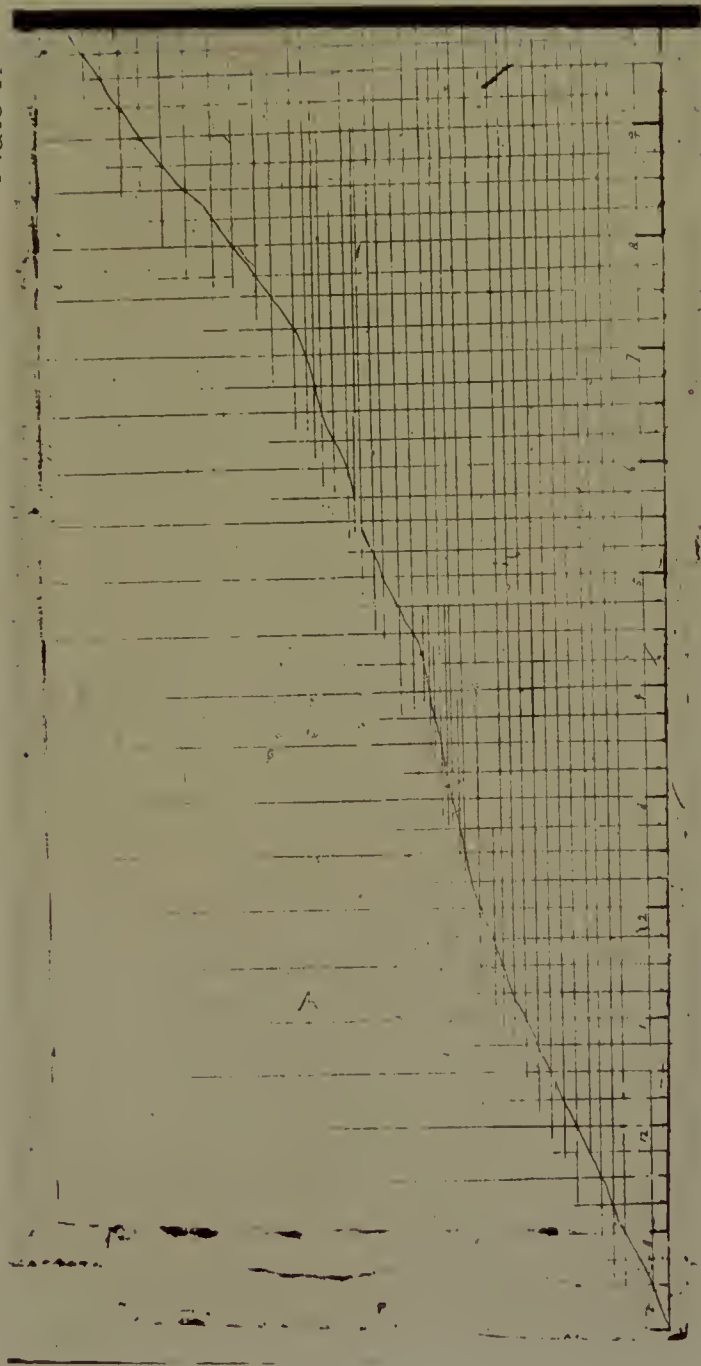


To illustrate Dr. Martin's Paper on the Secretion of Bile.

(12012-93.)

Curve of Bile Flow, No. 8.

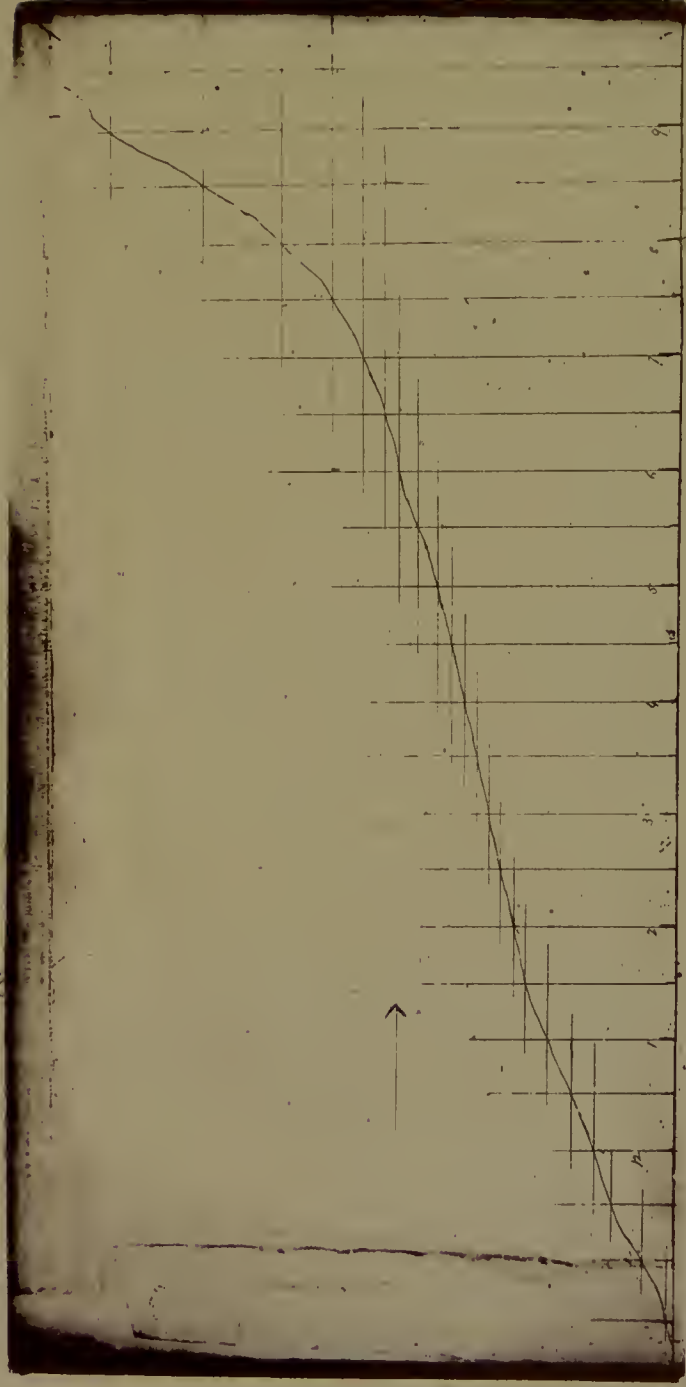
Plate II



To illustrate Dr. Martin's Paper on the Secretion of Bile.

Curve of Bile Flow, No. 4.

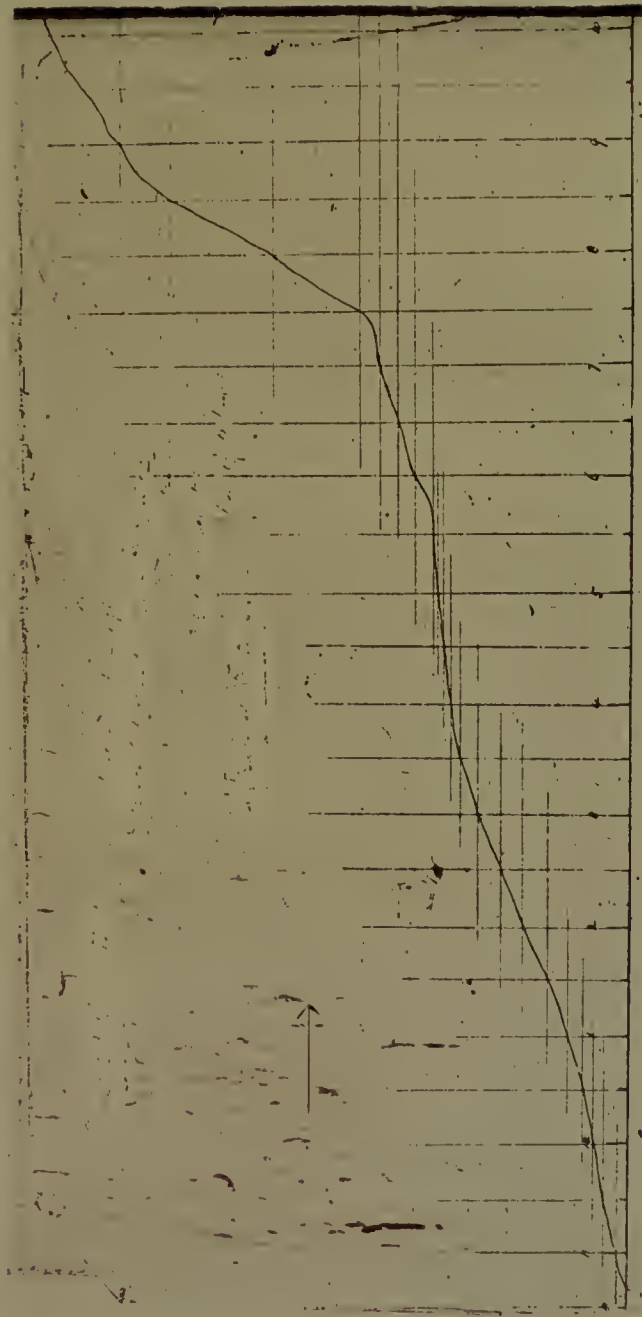
Plate III.



To illustrate Dr. Martin's Paper on the Secretion of Bile.

Curve of Bile Flow, No. 7.

Plate IV.



To illustrate Dr. Martin's Paper on the Secretion of Bile.

Curve of Speed of flow.

Plate V.

Unit of time = 10 mins.



To illustrate Dr. Martin's Paper on the Secretion of Bile.

Practical Pathological Teaching in the Medical School of the University of Melbourne.

H. B. ALLEN, M.D., Melb.

Professor of Anatomy and Pathology ;

And T. CHERRY, M.B., Melb.

Demonstrator of Pathology, University of Melbourne.

At the commencement of the present year (1892), the teaching of pathology in the Melbourne Medical School was revolutionised, and a short description of the new system may be of interest. A few words are necessary in the first place to indicate the training which the students receive before passing into the pathological classes.

The first year of the medical course is devoted entirely to chemistry, biology, and physics. The second year is engrossed by junior anatomy, dissections, physiological chemistry, histology, materia medica, and pharmacy, with hospital attendance in the surgical outdoor and casualty departments. In the third year, students are mainly engaged with senior anatomy and physiology, but they also attend lectures on surgery, and receive instruction in the methods of examining medical cases, chiefly in the outdoor department of the hospital, but partly also in the wards. They also attend *post-mortem* demonstrations, but not with the senior students. Special classes are conducted for them, with particular reference to organography and other parts of anatomy more easily taught in the pathological theatre than in the dissecting-room.

The principal part of the pathological teaching is placed in the fourth year. Prior to 1892, a course of seventy-eight systematic lectures was delivered, but this has now been discontinued. In lieu thereof, systematic demonstrations are held thrice a week during three terms (twenty-six weeks) of specimens from the Pathological Museum. These demonstrations are so arranged as to illustrate and amplify the information contained in the textbook, and are interspersed with lecturettes or lectures on subjects omitted or imperfectly treated therein. The Pathological Museum has been rearranged so as to lend itself to this system of instruction. In the course of the demonstrations, all specimens are removed from the jars, and passed round on plates for close inspection.

The students of the fourth year, being dressers in the surgical wards throughout the year, are excluded from the *post-mortem* room; but once a week a demonstration of the specimens obtained during the week is conducted for their benefit.

In the University laboratory special classes are held, during the first term for bacteriology, and during the second term for pathological histology, in the following manner:—

Practical Bacteriology.—For the teaching of practical bacteriology the students of the fourth year are divided into sections, each including six to eight men. The course consists of two hours' work twice a week, for five weeks. The first day is devoted largely to apparatus, such as sterilisers,

incubators, &c., the construction of each instrument and the method of its use being duly explained. Test tubes, flasks, &c., are cleansed and sterilised, and the preparation of nutrient material is commenced. On subsequent days cultivation experiments and microscopic examination of microphytes go on side by side, every step in the various processes being performed by the students themselves. The second day's work commences with filling and sterilising the test tubes. Putrefactive organisms are examined in the living state. The effects of various reagents upon them is noted. Permanent cover-glass preparations are made of these, and of organisms from the mouth. On the third day cultivation experiments are commenced. Test tubes, &c., are inoculated with typical forms, so as to exhibit characteristic varieties of growth upon different media, the effects of contact with air, the formation of pigment, &c. Coverglass preparations are made by Gram's method of typical forms such as streptococcus, mycoides, and megaterium. On the fourth day a fractional cultivation is made of a mixture of organisms; and Ziehl-Neelsen's method is applied to the investigation of tubercle bacilli in pure culture and in phthisical sputum. During the third week a fractional cultivation is made of the organisms from a drop of pus. The pus is examined microscopically. The air of the laboratory is subjected to bacteriological examination. Sections of tissue are examined for microphytes from cases of anthrax, septic pneumonia, pyæmia, and surgical kidney. In the fourth and fifth weeks, tissues are examined for the microbes of tubercle, diphtheria, malignant œdema, typhoid, and actinomycosis. Moulds and yeasts are studied. The sediment from a pressure filter connected with the metropolitan water supply is also examined. The cultivation of the forms isolated by previous fractional methods, or obtained from air, &c., is further continued.

This short schedule may be of interest as showing what amount of practical work in bacteriology we think fit to exact from every medical student. In the Museum there is a large collection of permanent cultures of bacteria, moulds, yeasts, &c., prepared by Dr. Franz Kral of Prague. The laboratory cabinets contain a great number of microscopic specimens showing the principal forms of bacteria, and the parasitic diseases of plants and animals.

Pathological Histology.—This course consists of two hours' work two afternoons a week during the second term (eight weeks). Five sections are usually distributed every afternoon. Processes requiring time, such as staining with hæmatoxylin, are completed before the class assembles, but other wise the staining, clearing and mounting are done entirely by the students. A printed description accompanies each section. The sheets of descriptions are supplemented by others briefly describing the methods of preparing specimens, and the set is bound for each student at the close of the course.

Morbid processes are taken in the order most generally followed by the text books, and the material for the sections is carefully chosen so as to furnish typical examples only.

In future years it is proposed to have an advanced course of bacteriology and pathological histology. The work will have special reference to that required for the examination for the Beaney scholarship in Pathology. Attendance on the part of the students will be optional.

Post-mortem demonstrations.—In the fifth year students are called upon to attend regularly in the post-mortem room, where, as far as possible, all cases of any interest are examined. Students are encouraged to make the sections themselves. The Professor of Pathology attends as Pathologist to

the Hospital, and is assisted by the Pathological Registrar, Mr. C. H. Mollison, M.B., M.R.C.S., who also acts in the absence of the Professor. The notes of all necropsies are taken by the Registrar, who makes all needful microscopic preparations. Interesting specimens are preserved either temporarily for the weekly demonstrations, or permanently for the Pathological Museum at the University. Specimens showing important morbid changes are hardened for more detailed examination in the University laboratory.

Whenever a microscopic section proves of value, one or more slides are preserved in the general cabinet of the laboratory. Rapid progress is being made in preparing sections of all important specimens in the Pathological Museum, and these will be placed in a special cabinet pertaining to the Museum.

Notes on a Case of Pernicious Anæmia.

J LOCKHART GIBSON, M.D., C.M., Edin., M.R.C.S., Eng.
 Hon. Physician, Hospital for Sick Children, Brisbane.

It may show some temerity on my part to bring before you the following notes, as my attention has been so completely taken up by other matters since the publication of my last paper on the blood in 1886 that I cannot be said to be *au fait* with recent literature on the subject. These remarks will at least have the merit of being based upon my previous work on the blood, and upon observations on the only case of pernicious anæmia that it has been my lot to come in direct and complete contact with since I deduced from experimental observations on dogs a series of developmental stages for the red blood corpuscles which, when taken as a whole, differ from the account of their development given by any previous observer. When inquiring into the matter, I began with a completely unbiassed mind, and possessed no theory with which to fit my facts. There were and are indeed so many theories regarding blood-development, and supported by such distinguished names, that previous pretty thorough reference to original papers made it perfectly clear to my mind that, if any good work was to be done, the only possible method of doing it would be to inquire for oneself from the blood-forming organs themselves, and treat both them and the work of others in a purely critical spirit.

The series of developmental stages observed by me, more especially in the bone marrow of dogs, seemed to be not only so clear, but when pieced together to yield so plausible and natural a view of the development of the red cells as to be for that reason also preferable to any other view published. I am more induced to bring these notes before you by the flattering notices of my work made so recently as December, 1890, before the Medical Society of London, by Dr. Stephen Mackenzie,* in his Lettsomian lectures on pernicious anæmia. Judging from his way of mentioning my paper, I will not be much behind date in addressing you to-day. Dr. Howell's† references to my paper in his very exhaustive account of the development of the blood corpuscles strengthens this opinion. The series of development changes described were seven in number, as you will see from the accompanying plate.‡ The six last stages are copied from my original plate in the *Journal of Anatomy and Physiology*; the first stage was then merely described in the text, but a drawing of it will simplify explanation. They were best observed in the bone-marrow, but also to some extent at least in the spleen and lymphatic glands. The bone-marrow of my pernicious anæmia case yielded even better examples of them than I had been accustomed to see in the marrow of dogs.

Mrs. A.B. died at the age of 57 years, on 7th May, 1890. I had been able to make some chiefly hæmocyto-metric observations on her blood during previous illnesses, though prevented by an illness of my own from seeing her

* B.M.J. Jan. 10th, 1891.

† *Journal of Morphology*, June, 1890.

‡ See plate attached at end of paper.

for some eight months previous to a few days of her death. In September, 1887, *i.e.*, two years and nearly nine months previous to her death, she first consulted me, and I recognised her to be the subject of pernicious anæmia, chiefly on account of the polymorphic character of the red cells in her blood. Her blood history was shortly this:—She had suffered from attacks of anæmia twice or thrice within the previous two years, and also when a young girl. When seen by me she had become very anæmic, suffered from swollen feet and eyelids, and slight rises of temperature, also from muscular cramping pains. I endeavoured to improve her condition by proto-chloride of iron alone, but failed, no distinct improvement occurring until arsenic was given in conjunction with the proto-chloride. An estimation of her blood was taken four days after the combined treatment was commenced and gave 1,545,000 per c.m. No estimation of the hæmoglobin was taken. The number of corpuscles then gradually improved, until four weeks after an estimation gave 2,620,000 to a c.m. of blood. And judging from her further improvement after prolonged use of the protochloride and arsenic combined with a change and a holiday, I was at the time of opinion, unfortunately without its being confirmed by enumeration, that the hæmocytes had reached nearly 4,000,000 per c.m. of blood. She recommenced her very active duties, chiefly of a philanthropic and church supporting nature, and persisted in her refusal to relax any of these, although I earnestly advised her to do so. In the latter part of 1888 she again required treatment, recovering, but not so completely, under the same drugs, but still enough to recommence and continue work. At her next breakdown in 1889, I was prevented by illness from being in attendance, and the same treatment was not carried out until I was brought in consultation shortly before her death, *viz.*, in April, 1890. It was then of no avail, and she would probably have failed to react had it been begun at an earlier period. On 19th April, 1890, the hæmocytes numbered 935,000 per c.m. of blood, while on the 5th May, two days before death, they had sunk to 560,000. A full dose of flax mas was risked in the faint possibility of an intestinal parasite being the cause. It had no beneficial effect, and caused no parasites to be evacuated. An interesting and possibly important point noticed with regard to the blood of this patient, at least during the last few days of life, was not only a great increase in the number of misshapen coloured corpuscles, and an increase in their tendency to crenation, but a very marked tendency to break down and dissolve in the sodium sulphate solution. To give an illustration. After enumerating the corpuscles in the ordinary way by Gower's hæmocyto-meter, I thought to take a second sample of diluted blood from the little mixing jar, and re-enumerate for the sake of exactness, but was astonished to find that although only a few minutes, ten or fifteen at the most, had elapsed since my first drop was taken, no hæmocytes were to be found in the liquid at all. They had all become either dissolved or invisible. It may be surmised as possible that the result of enumeration on this day at least, may have given a number of corpuscles per c.m. of blood below that actually existing in the circulation, in spite of the fact that they were counted as quickly as possible after mixing with the sodium sulphate solution. In an early paper on the blood* published in 1884, I pointed out the tendency that healthy hæmocytes have to lose their hæmoglobin, and ultimately to disappear if left standing for a length of time in a solution of a neutral salt. By this means I was able to prove that the so-called invisible corpuscles of Norris were merely decolourised and dissolving hæmocytes. Mrs. Ernest Hart had disproved the existence of these corpuscles in a somewhat earlier

* Journal of Anatomy and Physiology, vol. xviii "On the Invisible Blood Corpuscle of Norris."

paper, which came to my notice after the publication of my own. The corpuscles in Mrs. A. B.'s blood disappeared however with remarkable quickness, and not at all in accordance with any previous observations of mine. And that fact, together with the greater tendency of the hæmocytes to crenate, and some further observations to be mentioned under microscopic examinations of bone-marrow, lead me to think it possible that after all the true cause of pernicious anæmia is a faulty or imperfect manufacture of the hæmocytes leading them to breakdown too readily, rather than to any specially increased activity of blood-destroying agents or organs. And surely it is easier to understand the rationale of cells like leucocytes taking up effete and broken-down red cells rather than natural ones, just as it seems, to me at least, easier to explain the taking up by phagocytes of bacteria already rendered lifeless by the body tissues, than to accept Metchinikoff's views in their entirety. A fairly complete post-mortem examination was made by myself, though under the usual disadvantages of such an examination in a private house. It was made seven hours after death, and yielded the following:—No organic disease discoverable in any organ. *Pancreas* was perhaps more indurated than usual and somewhat larger. *Bowel* was very pale and appeared thin and transparent. It was unfortunately not opened. *Kidneys*,—capsule stripped off on the whole easily, though slightly adherent at parts, appeared normal. *Spleen*, perhaps a little larger and more succulent than usual. *Lymphatic glands*, somewhat larger than usual in the epigastrium and more succulent to the feel, elsewhere they seemed natural. *Thyroid gland* small and fibrous to feel. My attention was, however, specially directed to the bone-marrow, and that of the ribs was chosen as most readily obtainable and most constantly hæmopoietic. It was examined within nine hours after death, and according to the method formerly employed by me, as recommended by Neumann, viz., undiluted, diluted with sodium sulphate solution of sp. grav. 1024, and with the same very faintly tinted with methyl. violet. The microscope revealed by all these methods remarkable confirmatory evidence of my observations in the bone-marrow of dogs.*

Macroscopically the marrow squeezed out of the ribs had a dark red colour as if highly hæmopoietic. And it had this colour, it must be remembered, in a patient whose non-blood forming organs were most peculiarly and generally blanched. Microscopically there was in all the preparations a most remarkable preponderance amongst the cells of varieties *b* and *c* in the plate. So much so, indeed, that they were more numerous than the variety *a*. Numbers also like *d*, and a good many like *e* were seen. A confirmation of the belief that *b*, *c*, and *d* varieties possessed perinuclear substance identical with the intracellular substance of an ordinary hæmocyte could be seen most beautifully, viz., the perinuclear substance (†as previously recorded by me for similar cells in the marrow of dogs) showed in many cells a distinct crenation identical in appearance with that so well known in ordinary red cells. In fact, what I take to be the younger stages *b* and *c* crenated with much more apparent ease than the older stage *d*. These crenations when seen on surface view have an appearance identical with that of the bodies called by me‡ coloured microcytes, and subsequently by Foster and Stephen Mackenzie, coloured platelets. The coloured platelets were pointed out by me to be fragments of broken down hæmocytes, and to be only one of two varieties of 'platelets' or microcytes, found in the blood. They are, as Dr.

* Journal of Anatomy and Physiology, vol. xx, Part ii, page 345, vol. xx, Part iii, page 467. Reprint pages 38, 53, and 59.

† Journal of Anatomy and Physiology, vol. xx, Part ii, page 346, and Part iii, page 468, reprint—page 39 and page 59.

‡ Journal of Anatomy and Physiology, vol. xx, Part i, page 107—reprint page 107.

Howell rightly remarks, the microcyto of pathological literaturo. May not the polymorphism of the hæmocytes in pernicious anæmia, and indeed, the anæmia itself have some connection with this, viz., the corpuscles being hurriedly, and perhaps imperfectly made and young, break down more readily? Some of the cells resembling *d* were misshapen, *i.e.*, oval, and possessed an eccentric nucleus. The note I made at the time is the strongest I have made in support of the developmental series in this diagram, as I had never before seen such numerous examples of the varieties drawn. The nuclei were as clear in the unstained as in the stained preparations, and showed a very distinct network. A few dividing nucleated red cells could be seen, but my impression from the specimens support that previously recorded by me*, and according with the views of Löwit† and Denys,‡ viz., that multiplication occurs most commonly in cells in an earlier condition than variety “*a*,” and figured in the plate as “*a*”—*i.e.*, previous to the enlargement of the nucleus which occurs, according to my view, prior to the assumption of hæmoglobin. These cells “*a*” have been called by Löwit, Denys, and Bizzozero “Erythroblasts.”

This observation would certainly accord with what would be expected if this series of developmental stages be correct. As it would point to the conclusion, which I have indeed for my part upheld, that a fully developed non-nucleated red cell is merely a carrier of hæmoglobin, and might be compared to an enamel rod. The enamel rod without being exactly an example of retrogressive development, is an example within the living body of a cell losing active vitality in assuming to itself lime salts for the special function of mastication. *The developing red corpuscle to my mind loses active vitality and its nucleus after it has assumed hæmoglobin under the influence of that nucleus, and has thus been enabled to go forth as a carrier of oxygen to the tissues.*

The preparations examined supported as far as appearance was concerned the suggestion previously thrown out by me§ that the broken down nuclei of the coloured corpuscles could form the bodies I named§ colourless microcytes, and named subsequently by Foster and Stephen Mackenzie colourless platelets—really Bizzozero’s “blut-plättchen”—an idea supported by the fact observed by Bizzozero, others, and myself, and generally admitted (Stephen Mackenzie) that when active regeneration is going on the colourless platelets are more numerous; and also by the fact§ observed by myself, that the blood of anæmic patients, or at least the blood of those in whom an attempt at regeneration is occurring coagulates more readily than that of healthy patients. And I have frequently watched under the microscope§ coagulation spreading from the colourless platelets, and leaving them like nodes in the network.

If my view, therefore, be correct, it has at least the advantage of being complete, as the nucleus in breaking down has still a useful purpose to perform, and as blood formation is constantly going on, a constant supply of colourless platelets may be supposed to enter the blood stream. As a matter of fact, they seem always to be found when the blood is drawn, and they have been observed by Bizzozero in the circulating blood itself.

How the nucleus disappears from the nucleated red cell must still be considered *sub judice*, though Howell brings much evidence in support of Kölliker’s original contention that it passes bodily out of the cell—which

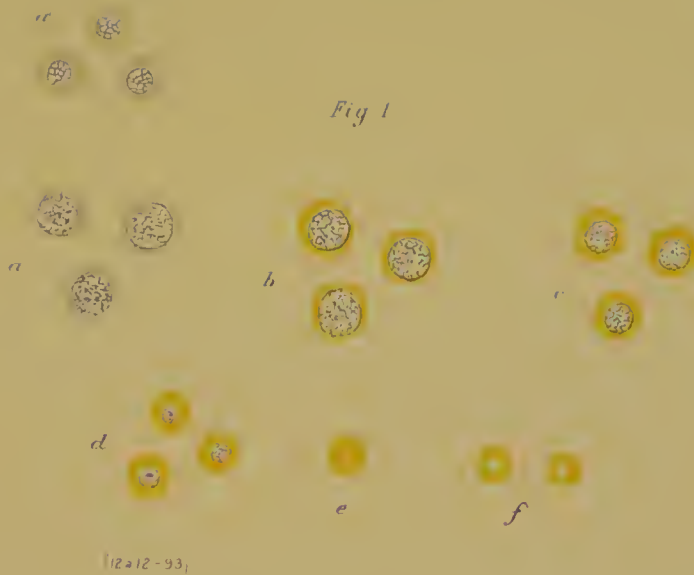
* Journal of Anatomy and Physiology, vol. xx, Part iii, pages 46–4708.

† Löwit—Sitzungsberichte d. K. Akad. d. Wiss. (1883, 1885, 1887.)

‡ Denys—La Cellule, iv, 203.

§ Journal of Anatomy and Physiology, vol. xx, Part i, pages 110, 113, 108, 111.

would, of course, be somewhat analogous to the method by which the extravasated red cells of the newt lose their nuclei. It may be urged that my observations have a tendency to show that the nucleus undergoes gradual solution while in the cell, instead of breaking down. If such be ultimately proved to be fact, it would accord in an interesting manner with the observations of Wooldridge, who denied the existence of colourless platelets in the circulating blood, considering them to be precipitated "A" fibrinogen. And a recent observation of Halliburton, communicated to me by Dr. C. J. Martin, would connect these. Dr. Halliburton having come to the conclusion that "A" fibrinogen is almost entirely made up of nuclei albumen. Dr. Howell, though at one time enamoured of my suggestion that the colourless microcytes are derived from the nuclei of the developing red cells, considers that he has disproved this by means of staining agents. He considers that the extruded nuclei of the red cells are gradually dissolved into the blood plasma. Dr. Howell supports on the other hand the view advanced by me from observations upon dog's blood, that the colourless platelets or microcytes are fragments of the nuclei of what he considers a distinct, but degenerative stage of the leucocytes, viz :—their multinuclear stage.



To illustrate Dr. Lockhart Gibson's Notes on a case of Pernicious Anæmia.

Healed Pulmonary Tubercle.

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PERHAPS no subject in Pathology and Clinical Medicine has aroused greater attention within the last few years than tuberculosis in its various manifestations and relations to man and animals. Though it was a subject for much theorising, and experimentation from the early part of the present century, it attracted still greater attention when Koch announced the discovery of the tubercle bacillus in 1882; and his subsequent announcement at Berlin in 1890, of his discovery of a substance which he had found to render guinea-pigs, which are naturally very susceptible to tuberculosis, immune against that disease, and which presumably, therefore, would be able to cure tuberculosis in man, was hailed with delight. The prevalence of tubercular diseases, and their well-known fatal effects, conduced to the immense excitement which followed on Koch's announcement. However, it is not my intention in this paper to relate any experience of the use of Koch's fluid, or of any other special mode of treatment, but rather, in opposition to the currently accepted belief, that if a person has once become affected with pulmonary tubercle, he is doomed to an early death, to show that the *vis medicatrix naturæ* does exert a powerful influence, probably to a much greater extent than we are accustomed to believe, and further to show that though pulmonary phthisis is assigned as the cause of death over 1,000 persons every year in this Colony, tubercle of the lungs is more prevalent than even these figures would lead us to suppose. Probably every practising physician has met with patients presenting all the symptoms and physical signs of pulmonary phthisis, who, after various modes of treatment by drugs, change of climate, &c., regain a large amount of health, and in whom the disease appears to be arrested; such patients, however, on return to former conditions of life soon relapse, and the disease reasserts itself; the cases of permanent cure being few and far between. But I believe there are a large number of cases of genuine tubercular disease of the lung which are not recognised as such; for example, cases of slight hæmoptysis, the source of which, in the absence of all physical signs, is believed to be the throat, also cases of apical pneumouia running an atypical course, catarrh of the apices, &c., which, because all physical signs disappear, and the patients get quite well, are regarded as simple and non-tubercular. On the other hand, however, there is a group of cases which may often be erroneously regarded as tubercular, and which are really "cases of apical dry pleurisy of rheumatic origin." Dr. Burney Yeo describes these as follows:—"In some cases you will often meet with a troublesome dry cough, difficult of cure, and on physical examination you will usually encounter at one or other apex some loss of resonance on percussion, diminished respiratory movement, not infrequently a little retraction of the sub-clavicular region, a creaking friction sound with

inspiration in the supra-spinous fossa, which disappears after a few very deep inspirations, and either feeble breath sounds or occasionally a faint sub-crepitant râle. Vocal fremitus is usually diminished and sometimes absent." Dr. Yeo regards these as due to rheumatic pleurisy for the following reasons:—"The cases occur in persons of the rheumatic diathesis, and are often accompanied by other rheumatic articular manifestations; they are usually traceable very distinctly to exposure to chill; there is constantly a history of pain in the region affected at the onset of the attack; and, moreover, the physical signs would indicate a much more advanced and serious condition of tuberculosis, were they due to that disease, than we have any other evidence of, for there is an absence of fever, of wasting, and of the general features of phthisis. Finally, these cases are cured by suitable treatment, such as we should apply to rheumatic affections of other parts, although the physical signs of adherent or thickened pleura in many instances remain." I have quoted this passage in full, because it has a bearing upon another point to be referred to later on. The fact that but a very small percentage of cases clinically recognised as pulmonary phthisis is permanently cured, while *post-mortem* observations show obsolete pulmonary tubercle in a comparatively large percentage of bodies, specially examined with this point in view, is probably to be explained as follows:—In cases in which pulmonary phthisis can be recognised by well marked and definite physical signs, the resistance of the tissues of the patients against the invasion of the bacillus has been largely overcome, and the morbid process continues to make headway, more or less rapidly, till the patient ultimately succumbs, while in other cases the contest between the tissues and the micro-organisms is much more severe and prolonged, and even before there are any well-marked signs of phthisis, the activity of the bacillus has subsided, the tissues resist its inroad, the disease ceases to extend further, and remains quiescent or is permanently cured.

The various forms of quiescent or healed tubercle are as follows:—

1. Fibroid cicatrices.
2. Fibroid pigmented tubercle.
3. Fibro-caseous masses.
4. Cretaceous nodules.
5. Caseous masses encapsuled by fibroid tissue.
6. Cavities.

These lesions are generally confined to the apices of the lungs, and rarely extend over an area larger than $1\frac{1}{2}$ to 2 inches in diameter. I shall now speak of these in more detail.

1. *Fibroid cicatrices*.—I mean by this a condition of the apices in which we find scarring and puckering of the lung tissue, often associated with a certain amount of localised thickening of the overlying visceral pleura; a little localised emphysema is also generally present. This scarring implies loss of tissue, and such loss might theoretically be due to different causes; a syphilitic gumma, *e.g.*, when healed would leave such a scar. My reasons for regarding these, however, as evidence of previous tubercle, not syphilis, are as follows:—(1) Very generally along with such scarring we find in the immediate neighbourhood a few scattered fibroid and pigmented tubercles, and sometimes even a small caseous tubercle. (2) Syphilitic gumma of the lungs is certainly a rare condition in adults, and a gumma at both apices, though, of course, not impossible, is exceedingly improbable. (3) Tubercle has a special predilection for the apices, which syphilis has not.

2. *Fibroid pigmented tubercle*.—These consist of firm, hard nodules, varying in size from that of a pin's head to that of a hemp seed, either scattered sparsely through the apex, or gathered into smaller groups. On microscopical examination these are seen to consist of a more or less concentric ring of fibroid tissue, with intervening elongated nuclei, and often deeply pigmented. The intervening lung is either fairly healthy, or shows a little induration. These may arise in one of two ways:—(1.) Either the cells composing the primary tubercular foci do not undergo the ordinary caseous degeneration, but become elongated and spindle-shaped, and subsequently form firm fibrous tissue; or (2) the cells undergo caseous degeneration, but the caseous material is soon absorbed, and the remaining cells become transformed into fibroid tissue, which undergoes cicatricial contraction, and thus all trace of previous caseation is removed. It is well known that tubercle when it attacks persons in middle or later life for the first time is generally more chronic in its course than when it develops in youth, or, say, adult life, and it is this condition of fibroid tubercle which is met with frequently under such circumstances.

3. *Fibro-caseous masses*.—These vary in size. They may be the size of a pea or larger, and are sometimes very hard, of a yellowish white colour. Instead of breaking down easily under the finger as caseous masses generally do, they resist a considerable amount of pressure. These appear to arise in much the same way as the last, by a combination of caseation and fibroid changes in the tubercles.

4. *Cretaceous nodules*.—These are small gritty masses sometimes set firmly in the lung, and sometimes surrounded by softer mortar-like material. The nodules are simply caseous foci, which have become inspissated, and the seat of calcareous deposits.

5. *Caseous masses encapsuled by fibroid tissue*.—Sometimes we find larger masses consisting of soft caseous material like putty, or thick, curdy pus, surrounded on all sides by a capsule of dense fibroid tissue. We may find one or more of these encapsuled masses, and frequently smaller fibroid tubercles scattered about sparsely in their immediate neighbourhood.

6. *Cavities*.—Then lastly we may find actual cavities, which are evidently healed so far as any tubercular disease is concerned. These, instead of being merely irregular excavations in the lung with ragged ill-defined walls, from which soft masses are continually falling into the cavity, have a well-defined wall consisting of firm white fibrous tissue, in the neighbourhood of which we may have a few fibroid tubercles. These cavities tend to become smaller and smaller from cicatrization of the fibroid tissue.

It may perhaps be an open question as to how far these various lesions are to be interpreted as really *healed* tubercle. That they are all tubercular, I think there can be no doubt, and from the fact that the patients in whose bodies they were found have, in many cases, reached a late period of life without any further development of tubercle, and have died of some non-tubercular disease, is pretty strong evidence that, so far as these patients were concerned, the tubercular process has been healed. In four of my cases, however, in which old lesions were found, the patient died ultimately of some tubercular disease. This may have been due to a recrudescence of the old disease starting from the old foci, or it may have been an entirely new and independent attack. But I shall refer to those again. As to the presence of the tubercle bacillus in these old lesions, observers are generally agreed that they are never to be found in fibroid tubercles, but that in the caseous and calcareous nodules they are generally present. In one case recently,

in which there was a small caseous mass, the size of a Barcelona nut, and completely encapsuled by dense fibroid tissue, I found the bacilli in the caseous material mostly in groups of 5-10, and showing no signs of degeneration. Further, no bacilli have been found in the fibroid tissue surrounding healed cavities.

There is another condition met with in the visceral pleura over the apex of the lung, the nature of which is a matter of doubt. We are familiar with the thickened pleura over an apex adherent to the chest wall, and which is found nearly always in cases of chronic phthisis. But the condition I now refer to is one in which no such adhesions exist. Sometimes the apex is covered by a cap of pleura, which may attain a thickness of one-eighth to one-sixth of an inch, which is more or less uniform, and met with either at one or at both apices. At other times, instead of being uniform, we find whitish patches of thickening, varying from one or two lines in diameter to the size of a sixpenny piece, these areas being separate from one another, but showing no extension into the subjacent pulmonary tissue. In other cases we meet with scarring and cicatrization in the apical pleura, the intervening parts being quite smooth, and the subjacent lung showing no signs of past disease. I think it quite probable that in some cases the condition of the pleura points to a past localised tubercular pleurisy. In other cases it is possible that they depend upon a previous attack of apical rheumatic pleurisy, already referred to in the extract from Dr. Burney Yeo's paper. I found this condition of pleural thickening apart from any other evidence of old pulmonary disease in 10 per cent. of my *post-mortem* examinations.

The percentage of cases of healed tubercle, as recorded by different observers, varies very considerably. The variation depends to some extent, no doubt, upon the fact that lesions, which are regarded as evidence of healed tubercle by some pathologists, are not so regarded by others. Cruveilhier states that it is rare to make a *post-mortem* examination on adults, especially on old people, without finding at the apices of the lungs changes which indicate healing of previous tuberclosis. Rogée and Déjerine found evidences of healed tubercles in 51 out of 100 cases of old people dead of other than tubercular diseases. Boyer found them in 157 out of 160 cases. Bollinger found them in 27 per cent. in 400 bodies examined. Staudacher gives 26 per cent. out of 787 cases. Massini gives 39 per cent. out of 228 cases. Heitler, from the records of the Vienna Pathological Institute, during the period 1869-1879, gives 780 cases out of 16,562 necropsies, or about 4 per cent. Harris found them in 38.8 per cent. of the bodies of patients dying in Manchester Royal Infirmary. He includes in this number four cases, in which death resulted subsequently from phthisis. Coats gives 23 per cent. in the bodies of patients dying in the Glasgow Western Infirmary from causes other than tubercle. Dr. Kingston Fowler, of Middlesex Hospital, London, gives 9 per cent. Dr. Sidney Martin, at the same hospital, found them in 9½ per cent. Brouardel found them in 60 per cent. of those dying over 30 years of age.

My own statistics are founded upon 200 *post-mortem* examinations made during the last 2½ years at the Sydney and Prince Alfred Hospitals, during the time that I have held the post of pathologist to those institutions. I have included in this list only those *post-mortems* which I have performed myself, as I have specially directed my attention to these lesions, and have always recorded in the list their presence or absence. Excluding the twenty cases already referred to, in which only pleural thickening was met with, one

or more of the above described lesions were found in thirty-two cases, *i.e.*, 16 per cent.; and of this number four died ultimately of some form of tuberculosis.

The following table shows, at a glance, the age and sex of the patients in whom the old lesions were found:—

TABLE A.

Age.	Cause of Death not Tubercle.			Death due to Tuberculosis.		
	M.	F.	Total.	M.	F.	Total.
Under 30 years	2	...	2	...	...	...
30 to 39 „	4	2	6	...	...	...
40 to 49 „	8	...	8	1	1	2
50 to 59 „	5	2	7	2	...	2
60 to 69 „	3	1	4	...	...	...
70 to 79 „	1	...	1	...	...	...
	23	5	28	3	1	4

The other table, table B, gives in detail the age, sex, side affected, nature of lesions, and cause of death in each case in which old healed tubercular lesions were found. You will observe that the most frequent cause of death among these cases was renal disease, seven cases out of the thirty-two having succumbed to this, and in only one case was death due to cancer. Dr. Coats found the most frequent cause of death in his group of cases to be pulmonary disease, other than tuberculosis, and cancer.

At Middlesex Hospital, from 1879–1886, out of 177 cases of obsolete tubercle, death was due to carcinoma or sarcoma in 78. (This large number of cases of malignant disease may partly be explained by the fact that at Middlesex Hospital there are special cancer wards.)

In Vienna, from 1869–79, out of 789 cases of obsolete tubercle, in 110 death was due to carcinoma and sarcoma, and 106 to tubercle other than pulmonary. In Manchester Royal Infirmary, out of fifty-four cases, thirteen were due to carcinoma and sarcoma.

Lastly, out of my thirty-two cases, the birthplace of the patient was ascertained in thirty. Three of these were natives of Australia (two New South Wales, and one South Australia), and of the remainder, the great majority were natives of Great Britain or Ireland. The number of cases is perhaps too small upon which to base any reliable deduction. We might be inclined to think that a good many of these patients may have left the old country on account of their chest trouble, and have been cured by the sea voyage and change of climate, and this may have been so; but we must remember the percentage of cases of healed tubercle found here, though somewhat higher than that recorded at Middlesex Hospital, London, is yet considerably lower than the percentage found in Glasgow and Manchester, where the climatic and social conditions are certainly less favourable for the cure of tuberculosis than here. One further thought is suggested by these figures, *viz.*, that pulmonary tubercle, when it attacks Australian natives, is much less rarely recovered from; but pathological and clinical observations in a much larger number of cases are needed either to confirm or disprove this assumption.

TABLE B.

Cause of Death.	Number of Cases.	Age.	Sex.	Both Apices.	One Apex.	Nature of Lesion.
Pericæcal Abscess	1	48	M	Both	..	Cretaceous nodules.
Cirrhosis of Liver	1	44	M	Both	..	Fibroid cicatrices.
Renal Disease	7	55	M	..	Right	Cretaceous nodules.
		55	F	Both	..	Cretaceous and fibro-caseous nodules.
		45	M	Both	..	Caseous and ectaceous nodules.
		37	F	..	Right	Caseous mass with firm fibroid capsule.
		40	M	Both	..	Encapsuled caseous masses.
		55	M	Both	..	Fibrosis and fibroid pigmented tubercle.
Alcoholism	3	50	M	..	Left	Fibroid pigmented tubercle.
		40	M	..	Left	Fibroid cicatrices.
		30	M	Both	..	Encapsuled caseous masses.
Accidents	4	39	M	..	Right	Fibro-caseous nodules.
		29	M	..	Right	Fibroid cicatrix.
		64	M	Both	..	Caseous nodules.
		35	M	..	Left	Caseous nodules.
		40	M	..	Left	Cavity, size of walnut, healed, with fibroid pigmented tubercles around it.
Myocarditis	2	44	M	Both	..	Caseous nodules.
		34	F	..	Right	Fibroid cicatrices.
Aneurism of Thoracic Aorta.	1	50	M	..	Left	Calcareous nodules.
Purulent Cerebral Meningitis.	1	?	M	..	Right	Fibro-caseous mass size of a pea, with fibroid pigmented tubercle around it.
Bronchitis	2	66	F	Both	..	Fibroid cicatrices.
		52	F	Both	..	Right Apex—two fibrocaseous encapsuled masses; apex puckered.
Cerebral Hemorrhage ..	1	70	M	..	Left	Left—small fibroid cicatrix.
Acute Myelitis	1	61	M	Both	..	Fibro-caseous mass at apex, also white pearl-like calcareous deposit in apical pleura on both sides.
Septicæmia	1	39	M	Both	..	Right—Cretaceous and caseous nodules. Left—Cretaceous, also three or four small encapsuled cavities with caseous contents.
Pyæmia	1	42	M	..	Left	Right—Fibrosis with caseous masses. Left—Fibrosis with one or two cretaceous nodules.
Malignant Disease of Bladder.	1	60	M	..	Right	Hard yellow caseous mass, size of a filbert, surrounded by softened calcareous material like mortar.
						Fibroid cicatrix.

Notes on a case of Congenital Stricture of the Œsophagus.

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THIS is a specimen of a stricture of the œsophagus, which I obtained *post-mortem* from a child aged 18 months. There had been symptoms of obstruction from birth; and the child, although before the last fatal attack, had been able to run about, had never swallowed anything but liquids. You will see that there are two minute openings in the stricture, about 1 inch from the lower border of the cricoid cartilage, the larger opening is plugged by a grape-stem, which must have been inadvertently swallowed. The parents refused any operation. The child was seen by Sir James Paget and Professor Macewen, but neither were able to throw any light on its causation. Development will not help us, as the stomodæum joins the œsophagus just below the cricoid cartilage.

Bacteriological Exhibits.

W. CAMAC WILKINSON, M.D., Lecturer on Pathology in the University of Sydney, arranged an interesting collection of bacteriological exhibits in his laboratory.

The most interesting exhibit was furnished by Mr. C. J. Pound, who had succeeded in obtaining from cattle affected with actinomycosis typical cultures (in agar-agar and gelatine meat infusion) of the actinomyces fungus. Mr. Pound also exhibited numerous specimens showing the ravages of bacteria in decaying teeth, as well as numerous excellent photo-micrographs of these and other specimens.

Veterinary-surgeon Park, of Tasmania, who was the first in Australia to prove that the cancer of cattle was no other disease than actinomycosis, showed remarkably good microscopic specimens of actinomyces, illustrating the variable appearance in the growth and development of the fungus. One specimen of exceptional interest showed that a packing needle swallowed and arrested in the wall of the stomach had become the starting point of an actinomycotic growth.

Mr. M'Garvie Smith had an excellent display of pure cultures of the tubercle bacillus.

Dr. Wilkinson exhibited numerous pure cultures of tubercle bacilli in every stage of growth, both those of human and fowl tubercle, and pure cultures of almost all the organisms known to be the cause of definite diseases, viz., diphtheria, typhoid fever, erysipelas, mouse septicæmia, hog cholera (rothlauf), pneumonia, Asiatic cholera, fowl cholera, anthrax, tetanus, and glanders, and of other pathogenic organisms such as the staphylococcus aureus, albus, citreus, streptococcus, M. tetragenus, bacillus of green or blue pus, Metchnikoff's vibrio, Finkler's vibrio, and Emmerich's bacillus. There were also numerous cultures of the non-pathogenic organisms.

These cultures were growing upon various media, agar agar, and gelatine meat infusions, potatoes, and bouillon. Typical and atypical growths of the typhoid bacillus on potatoes were shown.

Dr. Wilkinson also prepared a series of cultures of Koch's comma bacillus of cholera in gelatine meat-infusion and in bouillon, diluted and after the addition of weak sulphuric acid, and set them side by side with cultures similarly made of Metchnikoff's vibrio and Finkler's vibrio. The Indol reaction yielded by Koch's vibrio and Metchnikoff's was illustrated by experiment. All the apparatus for bacteriological work was on view, as well as a fine collection of microscopes from Zeiss.

Dr. Wilkinson also exhibited a very handy sterilizing apparatus (by means of the soda solution), made by F. and M. Lautenschläger, of Berlin.

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